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ARMY MEDICAL ORGANIZATION IN WAR, WITH SUGGESTIONS AS TO MILITIA AND VOLUNTEER AID.

By Surgeon-Major G. J. H. EVATT, M.D., A.M.D.

THE CHAIRMAN: Ladies and gentlemen, before introducing Surgeon-Major Evatt, who is to give us a lecture this afternoon on some of the arrangements for supplying the needs of the sick and wounded in time of war, permit me to say one word on the circumstance of my being in the honourable position of your Chairman. I should have much preferred seeing some General Officer of large military experience, or some one whose official position has led him to discharge duties of military administration on a larger scale, occupying the chair on this occasion; for it seems to me that the fact of a medical Officer being placed in the position of Chairman may make it appear that army hospital organization and administration in the field are regarded as simply a surgeon's matter; whereas, when we consider the large scale on which field hospital establishments are organized in the present day, their costliness, the intimate way in which their working is bound up with the work of many other army departments, and when we remember the influence for good or ill on a whole force, which they exert according as they are well or ill organized and conducted, it becomes evident that the subject is by no means merely a surgical one, but one that deeply concerns all ranks of the Army from the highest to the lowest. However, I have been asked to take the chair in a manner such that I did not feel I could decline to accept the post, and, trusting to your indulgence, I am here to discharge its duties. Allow me now to introduce Surgeon-Major Evatt, our lecturer, to you. He is a medical Officer of standing in the Service. He served in the Perak expedition of 1876, and subsequently during the war in Afghanistan, and has long been known both in his own branch of the Service, and in other branches, as having devoted a good deal of time and attention to the subject of military hospital organization. He has also made the subject familiar to many outside the limits of military life by his writings. He will doubtless bring before us many remarks and suggestions that have been carefully considered by himself, and that will be worthy the consideration of us his auditors.

Dr. EVATT: I propose in this paper discussing the subject of our medical organization in war, and to make certain suggestions as to its more efficient working, and further to lay down certain proposals as to the aid we should receive from the Militia and Volunteer services of this country in order to secure war success.

I trust you will allow me at the beginning of my paper to say how important a function this Institution fulfils, inasmuch as it allows an Officer of any branch of the Service to come here and offer his suggestions as to weak points which, in his opinion, may exist in the Service; and how important, in my humble opinion, it is to encourage and not to stifle such expression of opinion, provided always the just demands of a fair discipline are satisfied.

The medical service is in this respect of free expression of opinion more handicapped certainly than the artillery or engineer corps, for these latter arms of the Service have their own corps journals, where an Officer of any rank, senior or junior, may open up, under his own name, the most vital or radical discussions as to his corps organization. We as yet have no such journal, and hence the Officer who feels any changes desirable is forced to have recourse to other means of awakening public opinion far less weighty than signed papers.

In the first place I have to complain that—so far as my personal experience goes in the Service—the subject of military medical organization for war has received little study by military Officers, and I can count on my fingers the number of Officers I have met who fully appreciated the fact that they—that is, the purely executive Officers of the Army—are to-day as absolutely responsible for medical war efficiency as for the efficiency of the artillery or any other branch of army service. Few great military leaders have disowned this responsibility; on the contrary, the more one studies the lives of the great soldiers of past centuries, the more one can see that, according to their lights and to the then prevailing views of preserving life from disease, those military leaders were quite ahead of the age they lived in, and they felt for their men an abundant sympathy in guarding them against breakdown from sickness, and, if sick, did as much as they could to make them comfortable. I complain that to-day, in our Army, I fail to find any general knowledge of medical war wants diffused through the Service; and that while the medical service is struggling to put itself into unison with modern war demands, it finds itself handicapped, and not supported by current military opinion.

That it should be so is very lamentable; but I blame the medical service for much of this apathy or ignorance, for we have not taught the Army as we should have done. Had we but explained to Officer and soldier by lectures and demonstrations what our wants and aims were, we should have killed out opposition, and made partizans, instead of opponents, of the military Officer. Influenced by such views as these, I ask to-day to be permitted to explain what the aims of the more recent medical changes in the Army were, and why we have broken with the past organization of the medical service.

To understand the present system, I must ask you to go back with me thirty years to 1853, and the year that succeeded it, and see what

was the then method of working the medical service in war. Let us take the army that embarked for the Crimean campaign as our example, and see how we were then situated as regards the war system of the medical service.

The medical service then consisted of a grouping of medical Officers, commissioned by fours, threes, or singly, to every battalion or battery. These Officers wore the regimental uniform, were under the command of the battalion commander, and administered their regimental or battalion hospitals under the control and on the responsibility of the military commander of each unit.

In every garrison there were a series of small battalion, regimental, or battery hospitals, each entirely distinct and separate, where the sick of each battery or battalion was treated by its own battalion or battery doctor.

The nursing was done by a regimental hospital sergeant and a certain number of privates of each battalion who were placed by the Commanding Officer for duty in the wards.

The hospital sergeant was the executive agent of the military commander to maintain discipline in the hospital, and to see that the medical Officer's orders were carried out, for the army surgeon himself had no definite power of command over either sergeant, orderlies, or patients, but referred all questions of the kind to the military commander. If a regimental surgeon went sick or went on leave, a staff doctor, of which there were some sixty or seventy in the Service, was employed in filling up the sick man's place; but still the same system went on, and the staff doctor was simply the *locum tenens* of the absent man.

For every detail of work in the regimental hospital the Officer commanding the regiment was officially responsible, save only and except medical treatment. The discipline was done by the Colonel; orders were issued by the Adjutant; the Quartermaster did the transport and stores work, and the orderlies of the battalion did the nursing.

There were not in England in 1854 more than three, if so many, general hospitals; all the sick were subdivided in each garrison into small groups of regimental hospitals. An Army Corps consists, as you all know, of about forty-seven units, divided into divisions, brigades, and corps troops. When the army went to the Eastern campaign, the Army Corps had with each of the forty-seven units an hospital varying in size according to the size of the unit. Whatever size the hospitals were, they were purely regimental; the doctors wore the regimental uniform, and no authority existed for moving them from their battalions, or, if they were moved, no power existed to move the sergeants and nursing orderlies—men quite as important in their way as the doctors themselves.

This is what is everywhere called the regimental system, and in 1854 it was put to the test by actual war. An army exists for war; if it fulfils that function, it is good, if it fails in that duty, then, however successful as a social organization, however pleasant as a centre of comradeship, however full of interest and romance it may be, it is a sham, and had better be cleared away. I maintain that the then

organization of the medical service was, as far as a military war service is concerned, a sham. Measured by the war test it was a failure; why, we shall now proceed to discover.

Whatever the old-fashioned campaigns of last century were, with their easy marches, their slow manœuvring, their retirement for six or eight months of each year into winter cantonments, war is to-day a different thing. To-day rapidity in movement is a distinct factor in military success. The army that unencumbered can rapidly strike a blow at the enemy, is the army that has many points in its favour in the game of victory. I say now that any army which attempts in modern war to carry forward with it its sick and wounded men, a principle implied by the regimental hospital, is doomed to failure. The heaviest burden, the most killing weight an army ever carried with it, is the sick and wounded man, and how to get rid of him is really the keynote of all modern medical organization in every country.

Let us, returning to the Eastern Army of 1854, see how with its then medical organization it fulfilled the demands of modern war. Take its ambulance system on the field; go to the hillside of the Alma on the evening of 20th September, 1854, and see how it worked there. The total of regimental army doctors and of regimental orderlies with the Army Corps that took part in the fight that day was ample and sufficient under better organization to have done well by the comparatively few wounded.

There was not any attempt at ambulance organization. The battalion surgeons of the regiments under fire, aided by the bandsmen, carried away, or tried to carry away, the battalion wounded. There were no trained regimental bearers, no bearer-companies, no field hospitals, no ambulances, no hospital corps, no equipped hospital ships, and behind all was the chaos of Scutari with its "dreary corridors of pain."

I will ask you to put yourself in the place of the battalion surgeon of September, 1854, as he stood that night on the hillside of the Alma, and saw his friends and comrades lying on the ground with none to help them, no ambulances to carry them, no hospital corps to nurse them, the bare 'tween decks of the empty transport to be their hospital ships, and trusting to the sailors of the fleet for the hammocks they used as stretchers to carry them to their ships. I will ask you to think of Thompson of the 44th Regiment left on that battle-field with 400 wounded Russians with no attendant save his soldier servant, and say was it possible for us to stand by so fatal a system.

The faults I find with the system of 1854-55 are as follows:— In the first place, by keeping the sick of the army in a great number of small regimental hospitals in a garrison you effectually paralyze all real professional progress amongst the doctors. It is almost impossible for the small experience of a battery or single regimental hospital in peace to give a large field for medical study, and owing to the isolation of the doctors that intellectual friction which in the end produces progress, is not developed. Secondly, as regards nursing, if you make your nursing orderlies merely chance men taken from the regiment, you cannot develop a body of trained nurses who will stand

by that special line and give their whole heart to it. Remember that in a regimental hospital the only post for a non-commissioned officer was the one of hospital sergeant, and no intelligent private man will come if he is to remain always a private. In developing nursing then the old system failed to provide the best.

As regards hospital administration again it failed, because to make a great hospital work, you must be trained in great hospitals. Just as you cannot practise brigade movements with a corporal's guard, so you cannot make a doctor, trained in a small hospital with one hospital sergeant and a few orderlies and some twenty or thirty patients, rise suddenly to the power of administrating and controlling great war hospitals with hundreds of sick. He is paralyzed and overwhelmed by the responsibility, and as by having battalion hospitals you kill out your need of a hospital corps, when war comes you are left without subordinates, and have to fall back on the scratch teams of drunken pensioners of 1854–55. But if you do this your patients die, and your hospitals break down and become the byeword of the century.

Again, if you attach your medical men by threes and fours to battalions and render them immobile, then when you go on a campaign or into a fight, if one corps is burdened with sick or wounded and another corps is fit and well, you overwork your doctors in the sickly corps, while the doctors of the unengaged and healthy regiments remain idle.

So it was at the Alma, the whole of the doctors of the battalions of the divisions not under fire were quite idle, but an overwhelming labour rested on the doctors of the engaged battalions. You are forced *nolens volens* to fall back on a larger unit than the battalion, and you come as all armies come in the end, to the divisional unit. But if you are to keep your soldiers in good *morale*, you must let them see that if wounded in the fight aid is ready to hand. I do not call it aid to take the bandsmen and make them dressers of wounded. The band itself as music is an aid, and an important aid, to men in the day of battle, and to break it up is to handicap yourself against success. You must have trained bearers able to check bleeding and to afford real aid to the suffering; bandsmen never could do this. But beside these regimental bearers, you need to have, for the same reasons as for the doctors, some larger unit than the regimental ambulance help; that is essential and valuable, but it is insufficient. The battalion doctor cannot carry chloroform in any quantity, nor cooking-pots for the all-important soup, nor brandy enough for many wounded, nor operating tables and instruments demanded by modern surgery; and you need some help between the battalion surgeon and the field hospital farther in the rear, and that help is the admirable bearer company, of which I shall speak directly.

But if we go a step further, we come to the climax of the subject, and that is, that you cannot in war have a regimental hospital for seriously sick or wounded men. In the first place, if a division is told off for an attack, one brigade is sure to suffer more than the other, for one is in support and one is in reserve. This means more wounded in one brigade than the other, and you need some power of

equalizing the work, or the sick of the first brigade will be neglected, while the doctors of the second will be idle; and so you lead back again to the field hospital common to the whole division.

But say that we have regimental hospitals, and that the twelve regimental hospitals of a division have all a fair proportion of sick and wounded, and the division is to march forward, what becomes of the sick? If you take them with you, you will certainly be beaten by the enemy, for you will be creeping along, encumbered with vast trains of sick and wounded, and that certainly is not war; while if you leave the regimental hospitals behind, you advance without any medical aid.

And think too of the doctor and the scratch hospital left behind! You have during peace deprived him of all power of command over his subordinates, the Colonel had the discipline, the Adjutant issued the orders, the Quartermaster did the transport and the rationing, and, lo! all are now marched on, and the unfortunate doctor, who has been taught never to take any initiative, is now suddenly to become Commander, Adjutant, Quartermaster, and Transport Officer all in one. It is not possible; so slowly we work back again to a series of divisional hospitals, with their own nurses, their own Quartermasters, their own Transport, and controlled by doctors trained in peace to direct and manage their own hospitals in war.

Let us again turn and see what was the end of this Crimean chaos, for you must remember that although the Crimea and Scutari were great troubles, the Crimean campaign was not really a war trial at all. War means movement, and the Crimean Army never moved; practically it marched to the heights above Sebastopol, and there it dug itself in, it hutted itself, and there it remained until the town fell. Such wars are rare. It was really a great case of sitting out, and not fighting, and any one can see that if transport troubles and hospital troubles beset the sitting army that lay in front of Sebastopol, how far more heavily the same troubles would have fallen upon that army if a long line of advance into the Russian interior had taken place, and a line of communication had required to be held.

But public opinion demanded a full inquiry into the Crimean medical experiences, and in 1857 and 1858 Sydney Herbert's Commission sat and introduced a number of improvements, but it still made no radical change, and it really made war-efficiency little less within the range of practical achievement that it was before the war of 1854–55. It gave the doctors rank and pay. It founded the germ of a hospital corps; it developed a kind of hospital commissariat; it formed two general hospitals, supposed to be training schools for war work; but it still stood by the fatal error of the maintaining the regimental hospital and the regimental doctors in peace, and that really killed out all the other advantages.

As I have said previously, if you keep up regimental hospitals, you paralyze our training for war, and if you take all control out of the doctor's hands in peace, and make some one else responsible, you develop a body of weak-kneed men, who, when war comes, stand paralyzed by its demands on their energy.

To Lord Herbert we owe much, and his name will never be forgotten by the medical Officers, or by that great profession of which they are but the war section. But our debt to him is more that he recognized our sanitary duties in preventing disease than for any real advance in war organization. The Corps of orderlies he founded was not linked to us in title or control or sympathy. Of the two general hospitals he founded the one which bears his name was never anything but a series of regimental hospitals thrown confusedly together, and Netley is a great school, with a permanent staff who do not go to war. The purveyors, who were intended to be our assistants and our agents, became in the end quite independent of us, and the ambulance relief to soldiers on the field was so badly dealt with that, at the Committee on Army Transport in 1866, a very pretty discussion arose between the then Director-General of the Medical Service, the Chief Purveyor, and the Chief of the Transport Service as to who was really responsible for removing the wounded off the field. Nobody knew who was responsible even in 1866.

But the great means of securing progress in our medical service were the War of the Rebellion in America, the campaign of Sadowa, and the disasters of Sedan and its sequences. We began to study foreign systems more and more, and in 1873 and subsequent years we have developed and are developing a new system, which I think will stand scrutiny alike by the scientific soldier, the humanitarian, and the physician.

The scheme of unification now slowly making progress in our Army was introduced in March, 1873, further developed in 1876, and in 1877 it received a still further development. It is still, however, in its infancy, and when you remember what time it takes in England to introduce any change, I think we have not done badly.

In 1873 the medical Officers were removed from the various regiments in which they were commissioned, and the staff and regimental doctors were unified into the Army Medical Department.

Regimental hospitals as distinct units in each garrison were abolished and replaced by central garrison hospitals. The Army Hospital Corps was developed from its previous scattered condition into a strong corps doing all hospital duties, and the medical Officers were made responsible for the management and control of their hospitals in peace and war.

Gradually a body of fifty-two Quartermasters were developed who were to have charge of the subsidiary duties of storekeeper and paymaster of the hospitals, and in 1877 the command of the Hospital Corps was given over to the doctors.

But what interests us most is the war scheme of the 1873 organization.

Firstly, the three or four doctors of each battalion were replaced by one medical Officer who is posted to the unit, be it battery, battalion, or regiment, at the outbreak of the campaign, and who remains with it throughout the war. If he gets sick or wounded he is replaced at once from the divisional doctors. In war, sickness is rife, wounds are frequent, battalions are up to war strength, and there is full employ-

ment for a medical man, and further he is a great aid to *morale*, and has to do sanitary duties also. In peace it is not so. Batteries are absurdly weak, and battalions mere skeletons waiting for reserve men to fill them up in war. A medical man posted to so small a charge would probably come to grief from need of work.

In war time, however, besides the battalion surgeon there is now a body of regimental stretcher bearers, sixteen men trained to ambulance work who assist the surgeon in giving first aid on the field. The band keeps to its music, and a distinct body of men is told off for the wounded. This surgeon has also with him medicine boxes containing portable medicines and first dressings, but there is no battalion or battery hospital.

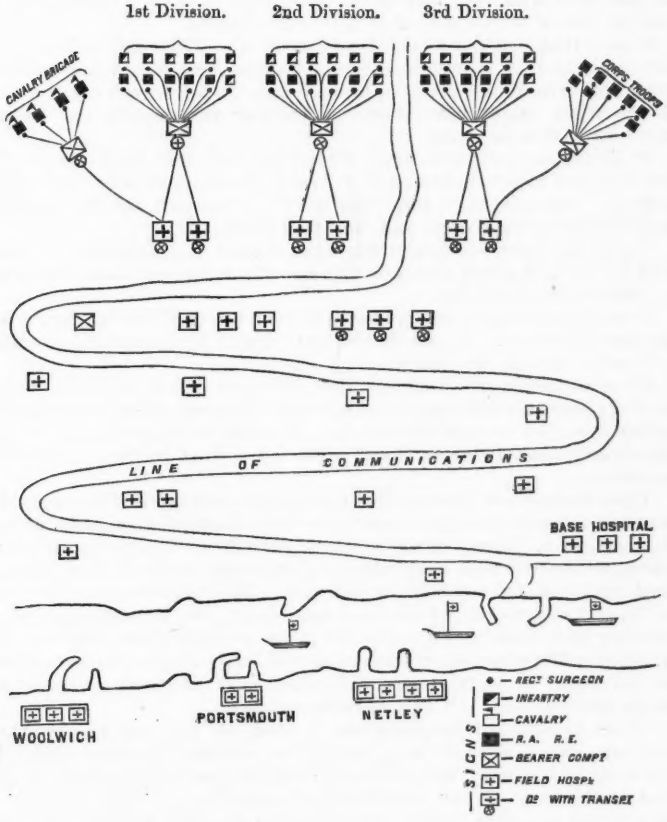
If a man be sick or wounded he is sent to one of the field hospitals of the division.

If you look at the Diagram on the wall you see at a glance the existing medical system for an army corps in the field. There are forty-seven units in the army corps, and there are forty-seven surgeons with those units. There are in addition forty-seven detachments of regimental bearers.

But an entirely new organization now intervenes, that is the bearer-company. Of these there are four with an army corps, viz., one with each of the three divisions, and the fourth is divided into half companies, one half with the cavalry brigade, and one half with the corps troops. I claim for the bearer company that it is the very best and most useful outcome of modern humanity in dealing with the wounded in war. No one can see it at work at Aldershot without recognizing at once its eminently practical character, and what an enormous boon it is to the soldier in war. It seems to me a great pity that it should be working at Aldershot in remote parts of the camp by itself, and not taking part in every field day, and not at Aldershot alone, but at every great military centre where soldiers can be mustered. Its work is most realistic, most thorough, and I feel absolutely certain it only needs to be seen to be appreciated.

In war time this company consists of eight medical Officers and some 200 Army Hospital Corps and Transport men who have with them surgery wagons containing an elaborate supply of instruments, operating tables and dressing supplies, cooking-pots for soup, brandy, various stimulants and suitable refreshment for the wounded, and ambulance wagons thirty-three in number for the removal of wounded. This bearer-company can break into two half bearer-companies, and it is believed that Lord Morley's Committee will separate them definitely into distinct companies. It is merely a question of detail. What is the function of these companies? When a man is hit say in the 1st Battalion, 1st Brigade, 1st Division, the battalion bearers carry him to the regimental surgeon who stops bleeding and applies a hasty first application to the wound, giving water or brandy if possible. The wounded man is then carried to the rear until he meets the ambulance wagons of the bearer-company and the Army Hospital Corps bearers. He is then taken over from the regimental men and conveyed to the dressing station of the bearer-company. This is the regularly

equipped spot chosen by the bearer-company to collect all the divisional wounded. Here the wounded man is examined by the operating surgeon, operated upon, thoroughly dressed, fed with soup,



wine, &c., and finally passed back by the ambulance wagons to the field hospitals, which must be always farther in the rear, and to reach which might cause great delay.

The bearer-company dressing station is really a very light advanced hospital, and a great collecting place of the divisional wounded, who may sometimes remain there until the field hospital is able to make its way through the crowded roads behind the fight and be pitched over the wounded. All this collection and removal of wounded, and

pitching and arranging the dressing station is a drill, a distinct technical drill which needs to be practised and learned just like any other technical drill. The great pity seems to me to be that it is not done with the Army at every field day, so that the Army might see and learn what they now do not know, that is, what a bearer-company is, how it works, and what is its organization.

I hope that one day Generals will arise who will study this company and see if it be not really what I claim it to be, an admirable organization and most essential to the Service. A few such companies at the Alma might have shortened the war very much, and have saved many valuable lives.

In Egypt, as you know, Lord Wolseley stated that the removal of the wounded was well done, and if it were known with what extreme difficulty the companies got their needful transport, all the world would say that the doctors had done well there.

When the bearer-company has handed over the wounded to the field hospitals, it again advances with the advancing army and resumes its place with its division.

It is still a young creation, slowly developing itself, but its future is absolutely assured. In our future wars it will be the most honoured and valued unit in the Army.

We now come to the field hospital. We saw that in 1854–55, with an army corps we had forty-seven regimental hospitals, fragile creations without trained nurses, without their own Quartermasters, and completely organized to break down when left behind by the advancing regiment.

These forty-seven fair-weather yachts that perished in the storms of war have been replaced by twenty-five field hospitals, complete units in themselves. Every army corps of 36,000 men has now in war these twenty-five field hospitals, each supposed to be ready to nurse, feed, and treat 200 wounded or sick men. Their equipment is packed in special wagons, they have abundant drugs, instruments, blankets, cooking and feeding requisites, and are as mobile as a battery of artillery. There are seven doctors to each hospital, one Quartermaster of the Army Hospital Corps, but alas! only thirty-seven hospital corps subordinates. Of this more by-and-bye.

These twenty-five hospitals are posted, as you can see by the diagram, two to each division, making six, six more in reserve behind the front of the army, and thirteen along the lines of communication and at the base. When an action is fought, the wounded are taken first to the dressing station and thence to the field hospitals of the division, these being filled, halt upon the battle ground, and two more hospitals out of the reserve are posted to the division, which is again able to advance with its bearer-companies and field hospitals ready for another fight. The sick and wounded in the halted field hospitals, if they recover, rejoin their battalions, if they get worse or are seriously hurt they pass back along the lines of communication from hospital to hospital to the base hospitals. Here they remain, and if they recover, rejoin their battalions, or if still ill, return to England in those well found floating hotels called hospital ships which have now

replaced the comfortless transports of our old wars. We have now, as you see, a definite system, and we know how we stand. We never knew it before, and success is sure to come to us if we work on these lines, which are themselves merely adaptations of the German system. We can tell exactly how a soldier ought to be cared for, and this was impossible in the confused old days. I do not claim for this system perfection in detail, for it has unfortunately many defects, but its principle is, I think, absolutely true, and no soldier can find fault with it on that ground. The fact is that the medical service is striving to force upon the Army a system of war organization framed to assist the fighting soldier in achieving war success, and as yet the average soldier does not see it. It only needs education to perceive its great advantages over past systems. As it gives a more decided field for medical energy and power of work, so it demands more labour from the medical Officers to work it, but it is entirely the interest of the Army that the medical Officers should have free scope to do good work. There is ample work for both classes of Officers. In the purely military line much has to be done by the pure soldier to teach his men the very great and urgent demands of modern military knowledge. Leave to us the hospitals and we will learn to make them perfect, and it will in the end be for the best.

One of Lord Morley's Commission wished to have the doctors again posted to battalions in order that they might learn to obey and learn to command. This is in truth quite what the old system never taught any army doctor. Having two masters, viz., the principal medical Officer and the regimental commander, we played off one against the other, and certainly did not obey very much.

As to command, when did a battalion surgeon ever learn to command? Why every rule and regulation was framed to paralyze all such acts. An old regimental surgeon never gave an order to any man, and as the Army rules reared him, so he grew up, and then having first deprived him of all power, he was expected in war to rise and do wonders on his own account.

It is not in such ways that men are trained for accepting responsibility. We are now on a better path, and shall no doubt make further progress.

I will now ask you to agree with me that field hospitals are needful, and should be efficient for the work they are called on to do.

I regret to say that manned as they are to-day it is absolutely impossible for them to do good work; nay, indeed, to work at all. But the remedy is easy, and very simple.

To nurse 200 sick men in a war hospital is a heavy task. It is not so in a peace hospital, for in peace many patients are trivially ill, and many are convalescent.

In war few of either are to be found in field hospitals. Trivial cases do not come to war hospitals, and convalescents are generally in a depôt near the base. At any rate, the general average of war patients are far more severe than peace patients. Now in peace we get one orderly to ten patients, and in war one to nine. It is completely insufficient. Naval hospitals get one per $7\frac{1}{2}$ patients, and

we all say that one per five sick is needed for war. That would require forty orderlies to nurse 200 sick men. But if you look at this table you will find that it gives only twenty-two for the purpose.

Establishment of an English Field Hospital for 200 *Beds.*

Steward	1
Assistant	1
Wardmasters	2
Compounders	2
Storekeepers	2
Clerk	1
Cooks	6
Nursing orderlies	22
Total	37

This allowance of thirty-seven men is completely insufficient to do good work. If you want nursing well done you must have rest and fair reliefs. Twenty-two men cannot nurse 200 with anything like thorough work. Increase it to forty per 200, or one per five sick, and the machine will work. If you read the Report of Lord Morley's Committee you will see in every page evidence of complete overwork of the nursing orderlies; so if in the next campaign we are to do good work we must have men given us to do it. Take, again, the cooks; six are allowed for 200 men, and that cooking for the sick is very trying, for there are many dishes to be made separately, and also much has to be cut up in small portions. We need eight cooks, or two per fifty sick.

Again, as to clerks, if we are to keep regiments informed of where their men are, we need a clerk to do it, and we have only one man to keep all the records and carry on the large correspondence. We need at least four clerks for the 200-bed hospital, so that if 100 beds are detached there may be two clerks for it. But the gravest cause of overwork and threatened breakdown is the complete absence of the coarser assistance needed in a war hospital.

I have placed here a comparative table (see p. 13) of an Indian and an English war hospital for 200 beds, and you will see the difference at once.

In an English field hospital there is not one man allowed to carry water for the hospital. This is the most killing want, as it goes at the root of all cleanliness, and if I am to get water to my hospital I must have men to do it. You do not ask a battery commander to work his guns with half the proper number necessary for the work. Why ask me to work a field hospital on such conditions?

We want this question to be dealt with before our next campaign, for we shall certainly go to grief if we do not get men to do this work. We are asked to do impossibilities, and we only ask that these questions be looked into to see that no man, however energetic, can work under such a handicap.

Comparison of the Personnel of a 200-Bed Field Hospital on the English and Indian Scale.

Class of Servant.	English Scale.	Indian.	Proposed.
Compounders	2	4	4
Wardmasters or dressers	2	8	4
Nursing orderlies	22	29	40
Clerks	1	1	4
Storekeepers (and Stewards)	4	7	5
Cooks	6	9	8
Dispensary servants	0	8	0
Watermen	0	15	8
Washermen	0	5	8
Sanitary police (sweepers)	0	23	8
Messengers	0	1	4
Carpenters	0	1	0
Tent-pitchers	0	10	0
Barber	0	1	0
Total for 1 hospital	37	122	93
Total for the 25 hospitals of an Army Corps	925	3,050	2,325

We want at least eight fatigue men to supply water for the hospital. This will give two men for each fifty sick. When we consider the number of baths, the washing in and about a hospital, it is seen at once that many men are needed.

Again, as to conservancy or sanitary police. In peace we have admirable drains to carry away all sewage from our hospital, but in war we have nothing of the kind, and in a hospital camp in war these men are much needed. In fact, it is deadly to the hospital not having them. I say, again, you are asking us to do impossibilities. You are asking us to make bricks not only without straw, but without clay, and we cannot do it. You are asking us to toil as we do in war like slaves at the coarsest menial work, and yet you give us no men to act as pioneers and to keep the place healthy and clean. When the need comes in great moments of trial there is no work I will not do for the sick man, but it is quite another affair to embark from this country of a campaign and to know that no proper provision is made for this all-important work. Again, as to washing, we have not a single man given us to wash the clothes, and yet we are blamed if the clothes are not clean.

We have, then, to appeal against this want of forethought which hurries us to war without the necessary means of doing good work, and while we are continually urged to be professional, no one is given us to carry water, to act as sanitary cleansers, or to wash patients' clothes. Again, as to messengers, if I want to send a note to a regiment or to an Officer close by my camp, I have no orderly or messenger, and as a consequence I must take a nursing orderly already overworked to do messenger duty, and so neglect of the sick occurs.

You see then by the scale I have drawn up that thirty-seven men are completely insufficient to work our field hospitals in war, and that ninety-three men are not only not too much, but barely enough to make a hospital work. You can now see how legitimate are our complaints, and how heartbreaking it is to go into the field with a unit completely organized for failure.

If England, or the Army, demands that her soldiers be cared for in war, it will not do for her to develop a flash of warmheartedness when a campaign occurs, and accuse her doctors of want of sympathy and neglect. England has her duty to perform, and that is to listen in peace to the fair and just demands of her doctors, and as far as they be legitimate, to grant them. Thus, and thus only, can war efficiency come. Nor do we in any way absolve the military commanders of their responsibility. Command has its duties as well as its rights, and one of its duties, as high as any, is to see that, before going on a campaign, the just demands of the medical service are met. You must not in all these matters legislate on the basis of heroism and self-sacrifice. The sentry at the outposts keeps vigilant not from self-sacrifice, but because he is regularly relieved, and so with our service. You must not draw up codes for saints and angels, but for average men, who get tired if overworked, get hungry if not properly fed, and who feel bitter in their heart if treated unfairly. These are points which are not fully dealt with in Lord Morley's Committee, but they are as true as anything can be, and no Officer I have spoken to on the subject can deny their truth. We need, then, large reserves for war, and I will, in a few minutes, when concluding this paper, show how they can be obtained.

Again, take another point. Where are our field hospitals at the present moment? They are entombed in Woolwich Arsenal, and until the Egyptian campaign no one ever saw one taken out of store. The Officers who saw them in use in Egypt saw them then for the first time, and no wonder that difficulty occurred as to the character of their equipment. In my opinion they should be taken out of the store-room, and posted to each divisional centre, and then the Army and ourselves would see what they are like, and find fault with them if necessary in peace, so that when war comes they may be efficient. This is the way the artillery is efficient. The battery commander does not read about his battery only, or hear that it is in a store-room in Woolwich Arsenal. He has his guns with him, and hence he is accustomed to them, and he and his men know how to work them. Give us and our men an equal chance. Let us have a month every year and practise our field work with the Army.

But, again, take another point. We have a Chief Medical Officer, a Deputy-Surgeon-General, who is responsible for the medical arrangements of the twelve regiments in the division, for the bearer-company, and for at least two field hospitals. Every soldier knows what an immense amount of correspondence this involves and what an anxious position the post is. Yet while the artillery commander and the Royal Engineer of the division have both Officer assistants as Adjutants, our divisional chief has no one whatever to assist him, and he is in conse-

quence completely overburdened with detail work and formal correspondence. I could tell stories of the result of this state of affairs in the field which would be laughable were they not really sad in their results on war efficiency. The remedy for this is not difficult; it is to give the divisional principal medical Officer a junior medical Officer as his secretary or Adjutant or personal assistant.

The attention of the Army should also be drawn to another very urgent detail of our war system, I mean the relations which should exist between the Army commander in the field, and the chief medical Officer serving with him. I maintain that it is entirely in the interest of the Service and of the nation that rules of the clearest kind should be laid down by the Secretary of War, defining the relations of both these officials. All will agree, I think, that intimate and confidential relations should exist between them.

A new theory, however, is now being advanced that the Surgeon-General with an Army in the field is not to be considered as the General's Staff Officer, but simply as the head of a subsidiary department, on a par with the smallest and least important branch of the Service. This is not the history of successful campaigns. We think it a highly injurious idea that would deny to the Chief Surgeon of the Army the status of a confidential Staff Officer of the chief commander. If you so cut off our chief from personal and continuous contact with the General, it will react on the whole of the medical service in the field, and we shall feel that he is not in the confidence of the Army commander, and that there is no one to be spokesman of our needs, and of the wants of the sick at headquarters. Such a condition of affairs will paralyze our energies, and injure our *esprit de corps*.

To-day, we need above all things definiteness as to our position. Either we should be accepted wholly by the Army, or we should be set wholly free from it, and allowed to work altogether under our own responsible chiefs as a distinct and separate department of the State. We can succeed perfectly under either conditions, but we cannot exist at all if we be indefinitely dealt with, if we are to be in the Army, but not of it; to be blamed for failure in war, but left unconsidered in peace; to be thrown over for want of success, yet not listened to in our cry for assistance; to be held down by the bonds of military discipline, yet denied military rights and privileges; to be required to share in all the risks and hardships of field service, yet denied the share of the glory of victory; then, despite pay however remunerative, and rank however high, we shall fail England in the hour of her need.

We read military history, and we gauge very thoroughly our value in the military machine. We recognize the bravery of the soldier and the devotion of the Officer, and we estimate perfectly the efficiency for war work of the battalion and the battery. But we also know well why and where your armies have failed. They have failed in what are called the Departments, that is to say in the Commissariat, in the Transport, and in the Medical services, and it is for the Army to say if it shall always be so.

It most certainly will always be so until one day a great leader arises who, reading the signs of the times aright and grasping completely the spirit of the age, sees that you must crush out with a firm hand all inequalities in the treatment of the various classes of Officers in the Service, and make every man in the Army from highest, to lowest, feel that all are working for the same end—the military success of the nation, and that the victory achieved by the Army is his victory, and its failure is his disgrace.

These seem to me to be the only lines on which to-day an Army in England can be successfully worked, and there is no reason whatever why they should not be made the rule.

If they cannot be made the guiding principle for the Army, at any rate set the medical service free from the military administration, and we will organize as the "Red Cross" societies organize, and build up under the Government a Medical Department for civil and military duties alike, and will send into the field a contingent of medical aid organized under its own chiefs, to be completely responsible for its own failure, and completely rewarded for its own success.

There is another very important question for us in war, and that is the commissariat question. Certain reformers of Lord Herbert's school maintain that we should have our own commissariat in the shape of a distinct Purveyor's Department. We are, I suppose, to free the general Army commissariat from all responsibilities for feeding the sick, and we, a weak, poorly-manned department, are to develop a rival commissariat for ourselves and let the greater commissariat go free. Now apply this principle to the Egyptian campaign. Let us remember that 583 per 1,000—that is nearly six men out of every ten in the Army—went sick during that brief campaign. Are we, out of our weak establishments, to feed, and that, too, daintily, six men out of every ten in the Army? But when we remember that the Army commissariat did not succeed in feeding the Army very successfully, with all its large establishments and masses of trained subordinates, it is hardly to be expected that we would succeed with our infinitesimally smaller commissariat section. In my opinion we should do nothing of the kind. We should hold on tightly to the principle that the General of the Army is responsible for the feeding of his men, sick or well. That if he goes to war, he should first of all think out how his men are to be provided with food, and that the sick soldier has a distinct claim on the general Army commissariat; and just as you post junior commissariat Officers to the commissariat charge of brigades and divisions, so you should, when a war is imminent, post commissariat Officers to the base hospital and to the various units of the medical service, and it shall be their business to provide such food and supplies as the medical men need for their sick. If this cannot be done, and we are to have our own separate commissariat department to ration our own 583 sick per 1,000 of the Army, we might as well simply undertake to ration also the odd men remaining out of hospital! An army with a poor defective commissariat service is really no army at all. It is certainly not a war engine, and no General has a claim to such a title who does not

see before a war begins that this all-important service will not break down.

Again, as to transport, we want a clearly defined transport allowance given to us. We should have a small section of purely medical corps transport; that is to say, enough to move our hospital wagons, and enough to horse the ambulances of the bearer-companies. This transport should be wholly our own, but be available for all camp duties when not specially needed for hospital service.

In our Army the question of transport has always been one of considerable concern, because, as it seems to me, it has been little studied in peace. With numbers of civilians trained and accustomed in peace to look after horses, we have, as yet, no militia transport corps. Yet I feel confident that one could embody, either from the militia reserve or by direct enlistment from the peasantry, several thousand transport militia men accustomed daily to the care and driving of horses. Why not adopt such a course and apply to the great supply services the principles already existing in the other branches of the combatant service?

We have a reserve of Officers, why not call upon them to train themselves for commissariat and transport duties as well as for the duties of the front line of the Army? As to the horses, an army reserve of horses is as easily formed as an army reserve of men, if only somebody takes up the question and sees it through.

As to our medical transport, we need only be told whether we are to look for it to the Army or not. If the Army says no, and if we are allowed to appeal to England for men and horses, we can get the best of both to come and help us.

But I think a militia transport service, and indeed also a militia commissariat corps of civil butchers and bakers, is as easily formed as a militia artillery regiment. If, as is often said, the Army is to be part of the nation, the more we weld together the Army and the people, the better for our war success.

Every hospital embarking for war should march down to the beach with its wagons, its horses, its drivers, its equipment, and its medical staff as complete as a battery of artillery is complete, and so disembark in the enemy's country. This was the aim of the medical reform party, and this aim will surely be realized as time goes on.

Again, at the base of operations we need some body of men who will do the unloading of the hospital ships and medical transports, and who will move the sick from the great base hospitals to the ships and the railways. For this work we have no one now detailed, and you may read in Lord Morley's Report that, while the few nursing orderlies were engaged nursing all day in the hospital, they were waiting all night at the station, to convey and carry by hand the sick to the hospital. If anybody imagines that you can thus work your men and yet make the hospital work with accuracy, they are entirely mistaken. I would suggest, then, half a bearer-company be posted at the base of operations for this special duty. You should also have for your lines of communication two or more bearer-companies for use as sick convoys, either to man the ambulance trains conveying the

sick from the front, or to transport and care for the sick proceeding to the base by road convoys in wagons.

There is one word more I would say before proposing Militia or Volunteer schemes.

It seems to me a sad thing that, as a department, we do not regularly teach the Officers of the Army and the men what sanitary laws mean. In the long tedium of foreign service and in the winter months in England, I would have the army doctor teach, by lectures, ambulance instruction, sanitary laws, the way to avoid the common diseases of campaigns. It is lamentable to think how completely ignorant Officers and men are of the very first principles of health preservation. I take it that no man is fit to command men and armies who does not know the laws of sanitary science and health preservation himself.

The ignorance on these subjects in our Army—always the very one that needs it most—is very great, and the loss of men in the beginning of a campaign from want of knowledge how to avoid sickness, is a most serious matter in a small army. Many men on our Egyptian sick list ailed simply from purely preventible disease. Want of food, want of shelter, and want of knowledge of what sun exposure means, contributed largely to it; for, this, however, the medical service is not to blame, save that it has not in the long era of peace taught the Army the knowledge it ought to have. If our cavalry horses had broken down in any numbers, would there not have been a great outcry? We have classes for veterinary instruction at Aldershot and Woolwich. But no combatant Officer, as far as I know, has ever been regularly taught to look after the health of his men. I notice that the German Officer is taught the elements of sanitary science, yet he, living in his own climate and serving only in European wars, does not need it at all so much as our Army, which serves in every possible climate, and is liable to every epidemic and malarial disease.

But while I thus propose to teach the combatant Officer, I cannot forget to say that you must let us learn all we can ourselves. To-day, however, your Army surgeons are shut out from all contact with the London schools. The Army Medical Department has no point of contact with the great centres of London medical and surgical knowledge. The London garrison is altogether in the hands of the special Guards doctors, and they alone have the chance of seeing the practice of the London civil leaders of medical science. We hope that one day a great central military hospital for the whole metropolitan garrison will be formed either at Chelsea or elsewhere, and that we who have to spend long years on foreign service in India, the Cape, Ceylon, and China, may have the chance of meeting the great London civil doctors, and learning all we can from them.

I now turn to the question of how we are to obtain the large reserves needed for war. We do not need heavy peace establishments, because in peace our hospitals have all the subsidiary services, viz., water supply, laundry, messengers, sewage, otherwise provided for.

But in war we want a body of trained men to be called out to assist us.

I think we should have, of course, our own army reserve of men trained in the hospitals, and passed back into the reserve like ordinary soldiers. But if you work this reserve too rapidly, we should only have boys to nurse our sick in peace, and hence we need a kind of extra establishment to be rapidly trained, say for one year, and passed into the reserve for the remainder of their service. These would be in addition to the ordinary peace-need of a hospital, and would be a kind of one year volunteers, as on the German or French system. We might get many men who would spend a year in learning nursing for the sake of getting into civil hospital or nursing employment.

But I think that we ought to have a distinct militia branch of the Army Hospital Corps, called out yearly like the ordinary combatant militia. These men would be equal in number to the needs of the home army hospitals in war time, so as to free the regular hospital corps and its reserves for war; 1,500 such men spread over England, Ireland, and Scotland would enable us to be quite certain that when war occurred we could call out a body of partially trained attendants who would replace the regular men. When these men were called out annually, either at Aldershot or at the district centres, it would enable us to muster sufficient men of the regular and militia hospital corps men to go through all the field drill of the bearer-company and the pitching and working of field hospitals, a work of which we are to-day ignorant, because the hospitals are packed away in Woolwich Arsenal, and the regular corps is too weak to go through this field service drill. I do not know a more economical system than this of obtaining men, and I imagine we could all recruit for it in the districts. I would form in it again a militia reserve on the lines of the regular militia reserve, and so get together a number of men fit for the fatigue work of the hospitals in war.

We cannot possibly succeed if the subsidiary services of the hospitals are not provided for, and the way to provide for them is to copy, as far as possible, the methods used by the Army to secure men. The formation of a militia hospital corps would, at any rate, give young men a chance of seeing if they liked the hospital duties, and they might eventually enlist into the regular service. I think if we once get the chance of enlisting a militia corps that, scattered as the medical department is over the country, it could secure recruits in sufficiency. While we have artillery, engineer, and infantry militia, I think we also need a medical militia. The militia educates men for the regular army, and so in like manner would our proposed militia hospital corps train men for our needs. I beg you will think of this proposed militia scheme. You cannot think to what difficulties we are put in England, even in times of petty wars, by the complete absence of such a body of men. We have to go about begging for help from every corps, and in the end the corps is weakened, its training is interfered with, and our nursing work is very indifferent.

Only give us a chance of acting as recruiting sergeants for a militia

corps of our own, and we shall, I think, succeed in inducing men to serve under our Red Cross, and learning discipline and ambulance work in our hospitals. Why should we differ from artillery, engineers, or infantry? They all have a strong militia help behind them. We, who need it greatly, have none. Can anyone devise a cheaper, an easier, a more constitutional, or a more common-sense scheme? If so, let us have it, our want is above all things *men*.

We come now to the Volunteer force of the country, and I would point out how completely insufficient its medical service is, measured by modern needs. It has no bearer-companies and no field hospitals; in fact, nothing behind the battalion surgeons and the regimental bearers. We need to organize in every county, and in every large town, a volunteer bearer-company or companies of a volunteer medical corps to supplement the already existing volunteer battalion surgeons. I believe that we could enrol in such a corps many hundreds of men who feel an interest in ambulance work, and many surgeons in civil life would take a commission in such a corps, and drill and organize the bearer-companies and field hospitals. I would organize such companies like ordinary volunteers. Dress them like the Army Hospital Corps, and drill them in all ambulance and field hospital work. They would fill up a great want in the volunteer army, and they would also send us many men for a campaign, and we should thus be strengthened for war.

To begin such a movement you must first of all train your doctors. Last year a scheme was put forward asking the medical students of London to practise ambulance work, and enrol themselves as a volunteer branch of the hospital corps. Several schools are now at work at this idea, and if the Secretary of State for War will give them a capitation grant, the movement will succeed. It will be of inestimable value to England in every way in developing ambulance knowledge amongst the civil doctors, and it is therefore to be hoped that official sanction will be given to the scheme. Your interest and sympathy in the movement would be a great aid. I hope we shall one day see paraded in London a battalion of trained medical volunteers composed of companies made up of students from the various metropolitan hospitals who will go through all the drill as privates, corporals, and sergeants, and so train themselves to command and control the bearer-companies and field hospitals of the future volunteer medical service. When that day comes we shall ask the brigade of Guards to meet the students corps in the park, and form up for the attack of a position; and as they dash forward over the field the bugles will sound the "lie down," and 500 men will throw themselves upon the ground as if wounded; the students corps with its stretchers, ambulances, and all the *paraphernalia* of medical equipment will then sweep over the field, take up the sham wounded, convey them to the dressing station, and go through the routine of sham dressings, and finally convey them to regularly pitched field hospitals in the park. When this day comes we shall provide for London a most interesting sight, and for humanity a real triumph.

It is by such instruction we shall educate the public, and if England once knows what it is we, her military doctors, have been aiming to achieve, her heart will be stirred, and we shall have our one desire fulfilled.

Working on these lines, when war has been declared, the Director-General would simply telegraph to the Divisional P.M.O. "Mobilize." At once the regular Army Hospital Corps in the district would be called in to form the nucleus of the field hospital. The district army medical reserve men would join at the same centre to fill up the cadre of the nursing staff of the hospital. The militia hospital corps would be called out, and would take over the district hospitals, the extra men of the militia reserve joining the district field hospital, and the volunteers of the local bearer-company would no doubt join in certain numbers. The whole would then form a complete field hospital, and with their equipment, transport, and staff, would embark as a body for foreign war. This seems easy, and it really is so. But it needs thinking out in peace, and that all arrangements should be made beforehand. I firmly believe it will one day come.

I have now roughly outlined the main points of our new medical field system. It is an interesting study, and I commend it to the soldier and to the civil physician for their consideration. To-day you have to reckon with new conditions in war, and the growing humanity of the race will not fail to demand due provision being made for the sick and wounded. If the establishments demanded are apparently heavy by comparison with the past, you must remember that the demands of a civilized race exceed the demands of old days and ruder times; but the remedy against these increased establishments is to attend to the sanitary condition of the soldier in the field, and so prevent men going sick. If they do, you must provide liberally for their care and nursing.

Out of our great troubles in past wars we in the medical service are being ourselves educated as to what we want, and we should fail in our duty to England and the Army if we did not boldly state our needs. The autonomy of the medical corps of the Army is essential to our success, and the more it is fostered, the more we shall rise to efficiency in peace and in war. The more we are made dependent on others for success, the more likely we are to fail. If the remarks I have made in this paper at all aid to the better understanding of the war needs of the medical service, I shall be amply repaid.

The CHAIRMAN: The lecturer has now brought before us a variety of proposals for improving the organization of the military medical service, especially in time of war, and it will be advantageous to us if some gentlemen who have had experience on the various topics which he has discussed in his paper, many of whom are here present, will give us the benefit of their observations, especially with regard to the advisability and practicability of the additions to the regulation *personnel*, and of the supplementary aid that he has proposed for the field hospitals; or, on the other hand, any alternative views they may hold which will appear to them to have a better chance of attaining the object that Dr. Evatt has had in view, and which, of course, we all much desire to see attained, namely, an increase in the efficiency of our military medical establishments in time of war.

Mr. R. W. TAYNTON: I am simply a volunteer of the last twenty-two years, and

in order to show, so far as medical arrangements are concerned, the disadvantages that the medical service has to contend with, I will detail my experience at the Windsor review. I went down there with the volunteers, acting under Surgeon-Major Gastein in the bearer-company. Two field hospitals were detailed for the troops. I was told off for No. 1 hospital. We had amongst the different cases a man who came in suffering from heat apoplexy. All the stores professed to be perfectly correct, but owing evidently to the cases not being under the control of the medical Officers, the material being simply kept in store, when an icebag was called for, there was nothing to be found in the cases that was immediately available for the purpose. All the material was stuck together. The old muslin and gutta-percha tissue had been kept in store for such a number of years that it was perfectly useless. I think it was from a quarter to half an hour before we could find any material suitable for the purpose of applying ice to the man's head. That is my experience of medical stores as served out to doctors, and so showing the necessity of the medical Officers having the absolute control of all the medical stores, and being responsible for the efficiency of the same.

Dr. LAWSON (Inspector-General of Hospitals): Before offering any remarks I should have preferred to have heard the opinion of the military Officers who are present upon the subject which Surgeon-Major Evatt has brought before us. There are few medical men who do not thoroughly recognize the necessity of the organization which he recommends. In fact, as war is carried on nowadays, it is an absolute necessity that we should have the means of suddenly concentrating our medical force upon a given point with all requisite stores and appliances to enable them to do the work. Our present arrangements do not admit of our doing that, and I merely repeat what I believe is the general feeling of everybody in the Medical Department when I say that it is absolutely necessary that this should be done before we can develop the energy which we are willing to give, but which under present arrangements we are prevented from doing. Of course there are a good many points of friction in doing this which will take place between the Medical Department and the military departments, and these must be settled by persons acquainted with both sides of the question coming together and making arrangements that will obviate them. Certainly the state of dependence of the Medical Department has greatly prevented the efficiency of the Service, and the medical man who wishes to carry out his duties properly is frequently placed in the position in which I myself have been placed of having to adopt means which I knew I was not justified in adopting by the Regulations. If anyone had objected I knew that I must give in, but I saw that if I did not do so the Service would have been seriously hampered. There is one point which Surgeon-Major Evatt referred to which he does not regard in quite the same light that I myself do. His acquaintance with the Service is much more recent than mine. Mine extends to something very close upon half a century, and when I entered the Service the regimental system to which he alludes was prevailing. I had the advantage of meeting a great many regimental Officers who were thoroughly acquainted with the proceedings in the Peninsular and previous wars. I quite admit the system as then prevailing was not such as would enable us to concentrate our forces upon a given point as required so as to meet the necessities of the present day, but I think if he looks back he will find that that system was deserving of a great deal more credit than he seems inclined to give to it, for I am sure that the amount of aid afforded to the Army by the Medical Department at that time and under those circumstances was worthy of a great deal of praise. I certainly myself strongly recommend that the relations of the Medical Department to the military department should be thoroughly and clearly defined, so that each party may know exactly how it can depend upon the other in order to carry out the objects desired. In the Crimea, as you, Mr. Chairman, are well aware, the Medical Department was very anxious to carry out a great many improvements, especially with regard to sanitary measures, but they were deprived of the power of doing so. Application had to be made to the military authorities, and the result was nothing was done. It was not until the state of things became so bad that the Minister of War sent out a Commission with power to do anything that they thought right, irrespective of the Officer in command or of anyone else, that these improvements were carried out. Many

things that the Medical Department had recommended to be done were not done by the military authorities, but when this Commission came out with the authority of the Secretary of War, they claimed credit for carrying out these improvements, and left it to be supposed that we did not know how to do them.

Brigade-Surgeon Dr. DON: Allow me to offer a few words upon one particular point referred to in Dr. Evatt's very interesting and, I may say, exceedingly lucid lecture. We all know his enthusiasm for the subject he has in hand, but now we have had a very good opportunity of judging of his thorough practical knowledge of it, I wish particularly to refer to the stress which he laid upon the formation and duties of bearer-companies in future warfare. As far as I can judge, there seems to be a great want of appreciation of the important functions of a bearer-company in modern warfare; and of late, particularly in the last Egyptian campaign, the true duties of the bearer-company were not, at all events, popularly understood. In these days, when it no longer takes the weight of a man's body in lead to kill or disable him, but when, as at Gravelotte, with arms of precision, 6,000 men were swept down in ten minutes, it is absolutely necessary, if we want to give timely succour to the wounded, that it must be given where they fall and when they fall. And therefore it is that the Bearer-Company Organization and the Regimental Stretcher Organization have come so prominently to the front in recent wars. It is very little use having magnificent base hospitals with every appliance; it is very little use having even hospitals in the front splendidly equipped, if the wounded on the field are allowed to bleed to death and sink before they can reach these hospitals. Therefore, I think, in view of strengthening in every possible way this first aid bearer-company system, that Surgeon-Major Evatt's proposal, to make a militia and volunteer reserve of bearers and of men who can be employed in field hospitals, a very important one. I think I know something of field hospital organization from a great deal I have had recently to do with these matters, and I also know probably as much as almost any one of the detail of these hospitals; and I must say I think a vast deal has yet to be done to make them efficient. As far as I can make out, a great deal is now being done, and will shortly be completed, to make them more efficient; and I feel confident that there is every desire on the part of the heads of the military departments to strengthen and organize these hospitals so as to make them thoroughly efficient in every possible way. I sincerely hope, if we should before long or in the near future be engaged in war, a very great improvement will be found to have been made both in the organization and equipment of field hospitals and bearer-companies.

Lieutenant-General Lord CHELMSFORD, G.C.B.: Mr. Chairman and gentlemen, as one of the few military Officers here present to-day, I felt it would be wrong if I abstained from saying a few words, to express to Surgeon-Major Evatt and those here present how thoroughly I myself, and, I believe, everyone in the room generally, have been interested in the lecture that has just been given. I cannot help feeling that the charge of want of interest in the subject-matter of the lecture on the part of regimental Officers cannot be gainsaid when looking at the empty benches, which I regret to see on an occasion when we have before us a question of so much importance. I think that those who have considered the question of medical treatment in the field will agree with Surgeon-Major Evatt, that the position of the Medical Department at the present moment is not sufficiently defined. At the same time, I cannot understand how anybody can suppose for one moment that the General commanding troops in the field is not responsible for the efficiency of every portion of his command, whether it be commissariat, whether it be transport, whether it be the medical, or whether it be the combatant portion. Surgeon-Major Evatt, however, who has come lately from the experience of the Egyptian campaign, would seem to be under that impression as regards his own branch of the Service. With regard to the complaint which he makes with respect to want of transport for the medical department during the Egyptian campaign, I am afraid he is not alone in that respect. We hear of similar complaints made by the commissariat and other portions of the force that their wants in this respect were not attended to. If we look back to discover who are really responsible for this serious want, it must, I think, be laid on the country at large, as represented by the Government, whether Conservative or Liberal. Both parties are

afraid to ask the country for the amount of money requisite to keep army organization up to that state of efficiency in peace-time which will make it immediately ready for war. As Surgeon-Major Evatt shows, it is clearly unfair that the medical or any other department should be blamed for not performing their duties efficiently, when they are not provided with the proper means of doing so. I do not feel inclined to enter into the vexed question of the abolition of the regimental medical system, but I know a great many Officers consider that a great injury has been done to the Army by that step. I confess, as a former Commanding Officer, I was very sorry indeed to see the regimental system completely broken up. My idea of reform is, that when you find a tree not doing quite as well as you wish it, you should not at once cut it down and try to replace it by another, but you should endeavour by changes in the mode of treatment, by pruning here and lopping there, to see whether you really cannot make it grow up strong and healthy. If you start by destroying a system entirely, and by trying to build up a thoroughly new one in its place, you must expect just as has occurred in the Medical Department that it will not work smoothly, there will be frictions and difficulties which it will be difficult to remove. I quite admit that the continuance of the regimental system, as it existed in the Crimea, was an impossibility, and Surgeon-Major Evatt is perfectly right in pointing out how utterly inadequate it was for the great war on which we then entered. I have also reason to believe that the present system, if fairly treated, can be made all that the lecturer desires. But there are difficulties in the way, and these difficulties are connected with expense. I am afraid the existing system, if worked as it ought to be, would prove so expensive, that however we may agree theoretically with what Dr. Evatt has laid down to be essential to its efficiency, however sanguine he may be as to what is likely to be done, many years and many failures may be required before an adequate amount of money is voted to enable that proper training and efficiency to be carried out in peace-time which the lecturer lays so much stress upon. I think the Army is greatly indebted to Surgeon-Major Evatt for having boldly and fearlessly brought forward his indictment against the working of the present system, and for having shown in so clear and powerful a way the very great and serious shortcomings that at present exist in our Army Medical Department. I only trust that his hopes may be realized, and that those in authority who hold the purse-strings, and who have the power to carry out what he has recommended, may see their way to do so, and that the special training for war which is required for the Medical Department may be carried out with as much care and attention to detail as that of the combatant portions of our Army.

Dr. J. W. Taylor: Mr. President, I came to-day in the hope of having some of the past experiences of a great many medical men who had served in different campaigns. I must say, like Lord Chelmsford, I am somewhat disappointed at the apathy (as shown by these scantily filled benches) of our own profession in this particular matter; and I think that the weakness of Surgeon-Major Evatt's scheme consists in the want of combination in the whole of the medical men, not only civil but military, in not making their voices heard, so that the country shall be compelled to expend the necessary money, which hitherto has been withheld from this service. No doubt one of the causes of our weakness is that medical men do not pull together as they should do; they get divided in their opinion, and when that is the case, you cannot wonder that difficulties arise. I gather from Surgeon-Major Evatt's paper that he wishes to have an equalization of force or strength, that is to say, that if the commissariat and transport can have their proper number of Officers and orderlies, so he very fairly puts before you to-day the point that the medical branch of the Service should also have its equalization of Officers and subordinates. There can be no doubt about that as a matter of fairness. Then comes the question of finance; money has to be expended, and we know very well directly an additional grant is asked for there is an outcry, as Lord Chelmsford has said, either by the Conservative or Liberal Government, that so much money is being spent, and that the medical men have done very well so far and must get on as best they can. I have had the honour of being surgeon to a volunteer force for some nineteen years, and have taken very great interest in the formation of ambulance corps and bearer-companies. I think our own was one of the first in the north of England to

carry out that plan; and it arose from a circumstance which took place at a large review of some 12,000 troops, held on Knavesmire, at York, some five years ago. On that occasion all the different battalion surgeons were told that the Army Medical Service would be provided with ambulance conveyances for the removal of any men who should fall out. We were on parade at Knavesmire, which, as you know, is a large open tract of country, with our backs to the sun, after having a hard day's work, and we had not been standing long in that position before in one brigade alone no less than eighteen men fell out, probably from heat and fatigue. There was not a single ambulance, there was not a single stretcher on the ground provided by the Army Medical Department; there was not a single ambulance wagon to convey any one of those men off the ground, and there was not a tree or anything to shelter them. We did the best we could to extemporize shelter by means of muskets and coats and such things as we could get, and then, as we were all marching off the field about one hour afterwards, an old cab was brought on to the ground to represent the Army hospital wagon of the Northern District. I determined from that moment that there should be no accident of that kind happen again to my own battalion, and I set to work at once to form ambulance detachments in my own regiment, and first of all to make myself efficient by passing the examination required by the Army Medical Service, in accordance with the instructions from the War Office; and we now have, not only in my own district, but all round us, growing up ambulance detachments, two men being taken from each company. Now there are considerable difficulties in working this, and it is on that point I want more specially to speak. You are aware that formerly, before battalions were consolidated, we had administrative battalions, and probably in one town or village we should only have one company of men. Now it would be almost impossible to take two men from a company and drill those men, because they do not form a detachment; we must have four men for a detachment. It is impossible to take two men from one village and two men from another, and form them into detachments for the purpose of drill. The result is, the whole of the men in the consolidated battalions have to be taken from that town which possesses the largest number of men. The expenses of working this have to be borne either by the battalion itself, if it can afford it, or by the medical Officer of the battalion who chooses to take that interest in his work. Many battalions are not very rich, and the incentive for work is certainly not very great when the battalion surgeon is encouraged by having to pay something like 35*l.* or 40*l.* out of his own pocket for the equipment of his own ambulance corps. But the grievance does not end there. No sooner do you get into camp than your volunteers, your ambulance bearers, cease to belong to the medical Officer. According to the Volunteer Regulations, every volunteer very properly must make himself efficient as a volunteer in order to obtain the capitation grant, and no sooner does the medical Officer get into camp than his ambulance bearers are taken from him, and they are permitted only by the sanction of the Commanding Officer to march past in the rear of the battalion on the day of inspection. They have no opportunity, save by the permission of the Commanding Officer or Adjutant, to drill, and you can easily imagine that men are very loath to turn out and do more work than is really necessary; and after they have had a hard day's drill in the field, they do not like to turn out and do ambulance drill as well. They say, in addition to that, "We belong to no one, having two sets of duties to perform." Now if we could have a separate ambulance corps, with the men clothed similarly to those of the Army Hospital Corps; to let them have a dress by which they shall be known as bearers, and let them be under the command (of course subject to the Commanding Officer) of the principal medical Officer of the battalion,[1] I am perfectly certain that, with some Government aid, there would be no difficulty whatever in getting up a very large army of willing and efficient bearers throughout the country, from whom could be drafted in any future war men able and willing to go abroad and serve, who have been trained, who have their certificates and their Red Cross badge, and who are quite as able to discharge their duties as those who

[1] At the same time permitting the capitation grant to be given for efficiency as bearers, *instead* of efficiency as marksmen, &c.

have been trained at Aldershot for the Army Hospital Corps. But of course this again means money, and the whole question turns upon finance. I can only speak as far as our Volunteer Service is concerned, but I know that we have very many difficulties to contend with. Medical men do not always feel disposed to be spending money out of their own pockets *con amore*, but they want to have some recognition of what they do, and to feel that their men, when they have them out with them in camp, shall be of some service. These are difficulties we have to contend with, and I am very glad to have had the opportunity of coming here to-day and hearing the paper which has been read to us, and offering these few remarks to you.

Captain O'CALLAGHAN, late 16th Regiment: I rise, Sir, with considerable diffidence, to make a few remarks on one point in the paper which has just been read. This diffidence arises from my seeing here some more experienced and qualified to speak on the subject than I am. The main object of that paper appears to me to be to contrast the present, or unified, system of the Medical Department with the former, or regimental, system; and in doing this, the former system has, I think, been somewhat hardly dealt with. The defects of the Medical Department, when we took the field in the Crimea, have been clearly laid before us; but some of those defects are to be attributed to our unpreparedness for war, and not to the fact that the system was regimental. We had a vivid description of the surgeon of the 44th, left on the field of the Alma, unassisted and almost alone, to deal with hundreds of wounded Russians; but had Dr. Thompson worn the uniform of the medical staff, instead of that of the 44th, would he have been able to attend to one more Russian? Had he belonged to the medical staff, instead of to a regiment, would that have supplied him with assistants and medical comforts, and with those appliances which were not then provided for the Army? While there is reason to believe that the majority of the Officers of the Army—I may say the vast majority—view with regret the disappearance of the regimental system, and would gladly see it restored, still none of them would advocate going back to the defects which then existed, such as the want of field hospitals, and which were not necessarily involved in the regimental system.

Dr. FARQUHARSON: I do not rise for the purpose of making an attempt to discuss the very interesting, graphic, and eloquent paper which Surgeon-Major Evatt has just read to us, a paper so full of detail that I think we can hardly attempt to discuss it in any proper sense without very careful study and reflection. It may disappoint him that more of us who are here have not taken up as our text the interesting system, perhaps somewhat Utopian, which he has brought before us, but the reason simply is that it is so elaborate and so carefully prepared that we should require to consider it very fully before speaking upon it. All I want to do is to make one or two remarks on the subject which has already been spoken to by my friend Inspector-General Lawson, and others regarding our friend the regimental as opposed to the unification system. No one would want to go back to the old plan which broke down so completely in the Crimea, but this modern unification system has now been on its trial for ten years, and I think we cannot afford altogether to disregard the opinions of the military departments upon its working. If you read the Blue Book issued by Lord Morley's Commission, you will see that almost every Commanding Officer of large camps as well as of regiments was entirely unanimous in saying that the way in which the unification system is now worked is uncomfortable, and indeed often disastrous in its effects, that is to say, that the Officers do not know whom to go to for medical attendance. The Commanding Officer does not know whom to apply to for information about the health of his men, and altogether there is a condition of confusion which might by a little care and arrangement be easily enough removed. I think there can be no doubt that the unification system as now carried out works badly for the medical Officer, because it withdraws him from the possibility of sharing the social advantages which he used to enjoy in former days in connection with his regiment; and, I think, it operates disadvantageously also in a professional sense, because while a certain number of medical Officers are attached to the large hospitals, there are also a certain number who have no connection whatever with the hospitals, and therefore they have no opportunity of seeing or attending any amount of cases in

the hospitals. I should have thought it quite possible that there might be some kind of combination of duty by which medical Officers might be attached to regiments for different periods, say for three, four, or five years, and at the same time might have the opportunity of following cases into the hospitals and attending them there, a plan which is well known in rural districts in the case of cottage hospitals, in which medical men outside who send in their cases are enabled to follow them up, and attend them whilst in the hospital. That would keep up the feeling of interest of the medical man in the men under his charge, and would stimulate a mutual interest between the Commanding Officer and the doctor that would work well for the Service at large. I do not see that there would be any friction as has been mentioned between the two classes of medical Officers, those on duty with the regiments and those in the hospitals, and I do not see that another objection which has been put forward, namely, that the medical Officer might not do his duty properly with the regiment and then go on to the hospital, holds good. In the old days when I had the honour of serving in the Guards, we simply did our regimental duties in the morning at 8 o'clock, and having finished those, we then went to the hospital and did our duty there. We then came back to the barracks and did whatever other duty might be waiting for us. In this way our two sorts of duty ran actually together on all fours. Of course all this question means expense, but this as laid down by Lord Morley's Commission would not be very great, and I think in the result would make the Service more attractive to medical Officers. I think if the Army hopes to get the best blood from the medical schools it is necessary to go back in some way to the regimental system, in order that, in a service which is very badly paid, some superior social advantages may be offered to compensate for tolerably hard work and bad pay.

Mr. J. FURLEY: I had no ambition, Sir, to swell the category of those who proverbially rush in where angels fear to tread, and I certainly had no intention of addressing this meeting to-day; but perhaps I may be allowed to make a remark upon the concluding paragraphs of Surgeon-Major Evatt's paper. One or two volunteers have already spoken on the subject, and I remember when I myself was an active Officer of volunteers, I used to think it was an absurdity to call our force an army, seeing that we had no regular medical department and no transport service, a position which has been so well described by Dr. Taylor; but I confess that I afterwards saw reason to change my opinion irrespective of the question of expense that Commanding Officers and others connected with volunteers already bear. I thought that as we were never to be called out of the country there was no necessity for an expensive medical department or for an expensive transport system, for should we unfortunately be engaged in defending our country we should be backed up by all the civil hospitals and nursing establishments, and by all such societies as the Red Cross, and the St. John's Ambulance Association, and therefore that a complete medical department was not necessary. Commanding Officers of volunteers are always very much disinclined to lose even a single file on parade, and there were many other reasons against a distinct department. But recent events have shown that the Army Medical Department is in need of a supplement in time of war. Surgeon-Major Evatt has referred to a new ambulance organization that has been started in some of the London hospitals, composed of medical students. The instruction that these gentlemen are so willingly undergoing at the present moment is of the most valuable description, whether their future career be civil or military. At the same time, they are much too valuable to be kept in the position of sick-bearers, and we must add to that organization, if it is to be of any real advantage, a large class of useful men of lower social degree. I have not the slightest doubt from my own experience that we should be able in a very short time to find plenty of men who would readily join those gentlemen, and thus make a really important organization to supplement the Army Medical Department in case of war. I do hope that this new association will very soon have the recognition of the War Office and the support of the Army Medical Department; and if the same capitation grant be given to the members as is allowed to volunteers generally, and if the hope be held out to them that in case of war their services will be utilized, and they will receive pay, then, I think, this much needed supplement will readily be found should it be wanted.

The CHAIRMAN: The time has so far advanced that I will not delay you by many observations. I should have tried to have made some remarks on many of the suggestions that have been introduced into Surgeon-Major Evatt's paper. Probably the most important are the additions which he proposes to make to the field hospitals, and the manner in which he proposes to obtain reserves in time of war for the bearer-companies and for the field hospitals. I hardly think that Dr. Evatt has sufficiently referred to all that has been done on these subjects to which a very great deal of consideration has been given. They were very fully discussed in the report which was furnished by Colonel Brackenbury, Major Kemmis, and myself on the organization of the medical services of different Continental armies as illustrated by the appliances at the Brussels Sanitary Exhibition of 1876, and by the Committee the formation of which that Report subsequently led to, that organized the bearer-companies and field hospitals of which the constitution and composition were embodied and described in the Army Medical Regulations of 1878. I still think that the recommendations of that Committee, so far as regards obtaining reserves for the bearers of the bearer-companies, will be found sufficiently practical and efficient. I will, with your permission, read a short extract from that Report respecting the tables of the bearer-companies and field hospitals. It is the following:—"The tables of the bearer-companies and field hospitals show a large number of men as hospital attendants drawn from reserves. The Army Hospital Corps at present cannot supply such a reserve. As these men are merely required for fatigue duties, as distinguished from skilled attendants on the sick, the Committee recommend that a proportion of the Army Hospital Corps should be enlisted for as short a service with their companies as is compatible with a due instruction in these duties, and be then for the remainder of their engagement passed into the First Class Army Reserve. Until the corps is in a position to supplement its companies by such reserves they consider it desirable that steps should be taken for detailing the number necessary for one or two army corps from the militia reserves." It is a very important matter, and I therefore think it well to allude to it, that we should have exact notions regarding the difference between reserve men qualified to act as bearers, and to do the fatigue duties of bearer-companies and field hospitals, and reserve men, who are qualified to act as nurses in the wards of the hospitals, to take the place of the hospital orderlies when these latter are removed from the hospitals at home to proceed on foreign service and do the duties which they are called upon to perform in time of war. There will be no difficulty, I anticipate, in getting sufficient reserve men who can be rendered available for doing hospital fatigue duties and the duties of bearers, acquaintance with which can readily be acquired in from three to four weeks, but I do not anticipate that the plan proposed of a militia hospital corps reserve to provide hospital attendants can be carried into execution without great difficulty; I mean such attendants as are competent to take the place of the regular Army Hospital Corps men for nursing the sick when the ordinary establishments have to be increased to what is necessary for meeting the wants of a time of war. This reserve must be composed of trained and sufficiently experienced men got from the ranks of the Army Hospital Corps itself. We had some experience on this point at Netley on the occurrence of the Egyptian campaign when all the hospital attendants were removed from Netley in order to make up the establishment for the field hospitals and bearer-companies proceeding to Egypt. At first we had a number of men sent from the ranks of the regiments at Portsmouth to take their places. Subsequently we had men from the reserves dressed as Army Hospital Corps men, and with a limited amount of training as bearers, who took the place of the regimental men in the wards. The surgeons much preferred the regimental men who came without knowing anything of the duties of Army Hospital Corps men, but who for the most part were disciplined, obedient, and tractable, and who in many instances took a great deal of interest in the ward work, to the reserve men who were sent to us as Army Hospital Corps men after three or four weeks' training in bearer duties at Aldershot. We had the greatest difficulty with these latter men, owing to their bad drunken habits and apparent dislike to the ward duties. Had they been sent as fatigue men to do fatigue duties, or even to act as bearers after the training they had had for a few weeks at Aldershot, they would no doubt have done those

duties well under proper control; but as ward attendants they were absolutely less useful than the regimental men from the ranks, who for the most part were willing to learn and to do what they could to help in nursing the sick. With regard to the increment that Dr. Evatt proposes to the field hospitals, I cannot look upon this as quite such an easy thing as he describes; it seems to me, on the contrary, a very serious and difficult matter. Dr. Evatt is proposing to increase the establishment nearly two-thirds over the present establishment in each field hospital. Multiply that by twenty-five, the number of field hospitals for one army corps, and see what a vast increase of men it is that is asked for to be trained, rationed, looked after, and paid. And it is also a matter for grave consideration whether such an increment as this can be held to be necessary. Some increase of establishment as regards attendants is, I believe, admitted to be necessary by all, but when comparing a British hospital with an Indian hospital, we must always remember that the large establishment of hospital servants in India is partly due to caste influences, just as our own private establishments of servants in India have to be very largely increased in number from the same cause. Again, with regard to some of the particular servants mentioned, those for the conservancy arrangements, the water supply, the washing, and so on, we must recollect that the Commissariat and Transport Department is at present responsible for executing these duties in the field. We can hardly expect, therefore, to have independently a sufficient establishment to be able to do all these things entirely ourselves. Practically in time of war field hospitals are generally supplemented by a certain number of men to do various fatigue duties. Some of them were so assisted in Egypt, I believe a certain number of men, Egyptian prisoners, muleteers, and others, being sent to the hospitals for service in various capacities. It has always been understood that the hospitals are to have the advantage of men extra to the fixed establishments being sent to them when needed to do fatigue duties. That we can obtain a fixed field hospital establishment as is represented in the table before us under present circumstances seems to me very problematical. But, however, without entering more fully on these and some other topics that might be enlarged upon, I may say that personally I have the fullest reliance, and I feel sure everyone at this meeting may equally have full reliance, that all the topics which Dr. Evatt has so eloquently brought before us to-day will be very thoroughly considered by the responsible head of the Army Medical Department. We have at the head of our Service an Officer of great sagacity, who has had for many years to consider and to carry out practically the organization of our war hospital establishments, not only in this country, but also in India, and who, as a member of Lord Morley's Committee, must have had very many of the subjects discussed to-day already brought under his consideration. He has also around him a staff of very able practical men to assist him with advice. We may infer also, from the exhaustive inquiries that have been instituted under the direction of the War Department, that the authorities there are alive to the necessity of continuing to add to the efficiency of the medical service, and that all will be done by them, as well as by the military authorities (who, of course, have the welfare of the sick and wounded troops just as much at heart as we have, whatever different views may be entertained as to the manner in which this is to be carried out), to place our field hospital establishments on as complete and efficient a basis as possible. From all these circumstances together we may rest confident that the important matters brought before us by Dr. Evatt, as well as the views expressed by the various Officers and others who have favoured us with their opinions to-day, will be taken into very full consideration, and may now be safely left in the hands of the authorities who alone have the power to bring them to a practical issue.

Surgeon-Major EVATT, in replying, said: I have but a few words to say in reply. As to Surgeon-General Lawson's allusion to the fact that general hospitals existed in our old wars, I am of course aware of that. But what were those hospitals? They were completely without organization, and were in the last century mere charnel-houses. You can call them nothing else; for without medical staff and trained subordinates you cannot have real efficiency. As to the volunteer service, I feel certain we have a large field there, from whence, if we try, we can obtain large war help; but we need to train them in peace for war, and not to wait until war

comes, to try and rush it, and send out untrained men. As to the militia, one must remember that any militiamen sent into the hospitals for service during the recent Egyptian War were completely untrained; they were taken out of the ranks of the militia reserve, and sent into the hospitals without any training whatever. To judge of militia help by such men would be quite wrong; and it is to avoid such confusion that I propose to train regularly a militia reserve for our use in peace, and not wait until war comes, and then rush them into our hospitals completely untrained. I want to see a regular Militia Hospital Corps called out annually and trained with us in the hospitals, instead of being kept at infantry drill in the barracks. We need such a body of men to work our home hospitals in war time as well as to furnish the coarser aid in the war hospitals. During war time we are put to great straits at home for men for our hospitals, and we have to withdraw combatant soldiers from their drills and their regular work to assist us. This acts injuriously in two ways—the men are inefficient as nurses, and they are taken away from their own special work outside. As to the question of water-carriers being needed in India on account of caste, I do not think that this is the case. If I had no water-pipes laid on to my house at Woolwich, I, too, in England should need a waterman to carry water for the domestic service of my house. In India we have no water supply laid on, and hence, caste or no caste, we need watermen. India is a hundred years behind London in civilization, and war is practically a return to the primitive savagery of the world when all the subsidiary services of a house have to be done by human agency. Sewage is removed in England by drains; in war we need human agency. A dhobie exists in India to wash clothes, but practically we have dhobies in England, only they work in laundries organized for the service of many families, and hence we do not see them so prominently before us. Nevertheless they do exist; and as in war you have no laundries, you must go back to the primitive washerman of an earlier time. It is in no sense a caste question, it is simply a return to primitive conditions. As regards the aiming at efficiency by the Director-General and by the whole of the War Office officials of every class, no one questions for a moment how ardently they hope to obtain complete war efficiency. For one hundred years the doctors have written, and spoken, and struggled for complete war efficiency, but it really is not possible to obtain it without educating the public as to what is needed. However strong may be the desire of the Director-General or the Commander-in-Chief to achieve everything we need for us, it will not be possible to obtain the money needed for these things unless public opinion is worked up to the standard that will make the House of Commons vote what is needed. We need as it were a band of missionaries of the Red Cross to go out and preach a new crusade, and teach the people what we need. When they know what we want, then, and only then, will they give it to us. The people of England and the taxpayers talk about humanity; let them, however, do their share and pay for humanity also.

The CHAIRMAN: I have now the very pleasant duty of asking you to express your thanks to Surgeon-Major Evatt for his very interesting and suggestive lecture, which thanks I am sure you will fully agree with me he richly deserves.

Royal United Service Institution.

MEMORANDUM FOR 1884.

The Council having decided that a Gold Medal be granted annually for the best Essay on a Naval or a Military subject, make known the conditions of competition:—

(1) The Candidates must be Members of the Institution, or persons eligible to become Members, according to the following Extract from the Bye-laws, Section II., paragraphs 1 and 2, viz.:—

1. "Princes of the Royal Blood; Lords Lieutenant of Counties; Governors of Colonies and Dependencies; Officers of the Army, Navy, Marines, Her Majesty's East Indian Military and Naval Forces, Militia, Yeomanry, Royal Naval Reserve, and Volunteer Corps, shall be entitled to become Members *without Ballot* of the Council.

2. "Ex-Governors of Colonies and Dependencies; Officers who have quitted the Service; Deputy Lieutenants of Counties; Civil Functionaries who are or have been attached to the Naval and Military Departments; the Master, Deputy-Master, and Elder Brethren of the Trinity House; and Army and Navy Agents; shall be *eligible* to become Members by *Ballot* of the Council."

(2) The subject for this year shall be of a Military character.

(3) The Essays must not exceed 48 pages (exclusive of tables), of the size and style of the "Journal," each page averaging 540 words.

(4) The Essays must be received by the Secretary, on or before the 1ST NOVEMBER, 1884, except in the case of those forwarded from India, China, the Pacific, and Australia, which will be received to the 1ST DECEMBER.

(5) The Essays must be strictly anonymous, but each to have a Motto, and to be accompanied by a sealed envelope with the Motto written on the outside, and the name of the Candidate inside.

(6) The Essays will be submitted for decision to three Referees chosen by the Council; but no award will be made by them in favour of any Essay which does not, in their opinion, attain a sufficient standard of excellence.

(7) The award of the Referees will be made known, and the Medal will be presented to the successful Candidate (or his representative) at the Anniversary Meeting, and his Essay will be printed in the "Journal."

The following is the subject for the Essay for the present year:—

"Should the European Army in India continue as at present constituted, or should it be converted in whole or in part into a local force?"

By Order,

B. BURGESS, CAPTAIN,

Secretary.

WHITEHALL YARD, LONDON

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LIEUTENANT-GENERAL SIR ARTHUR J. HERBERT, K.C.B., Quartermaster-General, in the Chair.

NIGHT ATTACKS.[1]

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PART I.—*Their Nature. Classification. Causes and Motives. Justification. Preparation.*

THE study of fighting by night is, when embracing all connected with it, very extensive, for in addition to embodying most of the branches of the science of day battles, it has many others peculiar to itself.

To bring the subject within manageable limits this paper will be strictly confined to such actions as have either commenced or finished in the dark, and points connected with ordinary fighting will only be touched on when it appears that they must be materially modified to meet the requirements of night attacks.

In consequence of this limitation the following nocturnal operations will not be considered :—

1. The taking up of a fresh position during darkness so as to surprise the enemy next day, as Frederick the Great did at Liegnitz, and Napoleon at Mantua.
2. Night marches undertaken to turn positions or lines of defence, of which the campaigns of Marlborough afford such brilliant examples in our own military history.
3. Night marches made to gain time, or avoid pursuit, as Dumouriez's before the battle of Valmy.
4. Combats in the dark, which have simply been parts of great battles and not distinct attacks of themselves. Such occurred at the celebrated battle of Kadesia in 638, which joined all Western Persia to the Empire of Islam, and at the well-known relief of Turin in 1706, by Prince Eugene.
5. Battles prepared, but not begun before dawn, such as Inkerman, except a few of their incidents which illustrate points of night tactics.

Such operations as those just mentioned are doubtless closely connected with the subject, but so is the whole question of outposts, &c., and in night warfare so much depends on small details that it is very necessary to draw the limits of its study as close as possible.

Night attacks have been incidents in the wars of all ages. A detailed account is given in the Old Testament of one made by

[1] Several recent events in our own military history have been omitted, as I have thought it more becoming not to bring into discussion operations conducted by my superior Officers.

Gideon on the Midianites and their allies. The Athenians under Demosthenes made an unsuccessful attempt on Syracuse. The great Hannibal defeated the Consul Junius on one occasion by wearying out his troops by cavalry attacks all night. On Trajan's Column there is a scene supposed to represent the capture of a strong post by moonlight. And everyone has heard of the attack by Gauls on the Capitol, frustrated by the alarm given by the cackling of geese, which Napoleon referred to when he said, "The success of a *coup-de-main* depends entirely on luck, on a dog or a goose."

It is, however, in modern wars that we must seek for useful examples.

This kind of enterprise, having been very frequent in the last century, became rare, except in the case of sieges, during the Napoleonic period, but it is again beginning to be common and is now advocated by many writers.

Clausewitz explains the decrease by the fact that the more active tactics of Napoleon rendered the knowledge of the enemy's position difficult to obtain and uncertain, and that the bivouacs then in use were less easily distinguished than the regular encampments of Frederick the Great's time. A study of the examples of history appears to prove also that it is almost, if not quite, a necessity for the attack that the defence should have some well-defined object to hold, such as an entrenchment or village, where it is certain to make its stand, for if no resistance is met with, the assaulting columns will lose themselves in space as a boxer missing the aim of his blow loses his balance; as the quickly moving masses of French troops seldom entrenched, this is another reason for the decrease.

In Frederick's time, too, most of the instances were the surprises of towns, which then played a much greater part in war than they did later on, and the chief object of all night attacks was to obtain the advantages of surprise. The troops of Napoleon and those of his enemies contained too many veterans to be easily caught napping, and so it is only towards the end of the period, when his troops were young and unformed, that we find this kind of attack much used.

Now-a-days, though the advantages of surprise are as great as ever, there is a much stronger reason for undertaking the risks of night fighting; viz., the deadly effect of modern firearms and the facilities for avoiding it afforded by the veil of darkness. At the same time, also, that the advantages of night attacks are becoming greater, their execution is easier, for the same cause renders entrenchments necessary, while practice and progress should be able to simplify the combinations and manœuvres required.

Before proceeding further in the general examination of the subject, it may be as well to divide the various kinds of attacks into classes and point out the leading peculiarities of each class, as the nature of an engagement varies with its object, locality, and surrounding circumstances. The division has been made as follows:—

Class (*a*.) Attacks on entrenched positions.
„ (*b*.) Attacks on important points preliminary to a general action at dawn.
„ (*c*.) Attacks to recover important posts.

Class (*d*.) Attacks to capture important posts.
„ (*e*.) Attacks on posts or parties which in the daytime would receive support from others.
„ (*f*.) Attacks made by the weaker belligerent to extricate himself from a dangerous position.
„ (*g*.) Attacks to effect the passage of an obstacle.
„ (*h*.) Attacks made in continuation of actions begun in the daytime.
„ (*i*.) Attacks made to cover a retreat.
„ (*j*.) Attacks made to harass the enemy.
„ (*k*.) Surprises of strong places.
„ (*l*.) Assaults on fortresses.
„ (*m*.) Sorties.
„ (*n*.) Actions arising from the chance meetings of troops.

These classes may seem too numerous, and some examples doubtless belong to more than one class, and some of the features of one class resemble those of another, but each has some peculiarity of its own, and the thorough subdivision will in the end tend to simplification.

Class (*a*).—Attacks on entrenched positions, *i.e.*, such as have been whole actions in themselves and not parts of larger ones.

The hope of gaining the advantages of surprise has generally had a considerable influence in causing these enterprises, and sometimes the object has been to save the time necessary for a regular siege, as in the cases of our storming the Camp of Cornelis in Java[1] in 1811, and the attempt by the Prussians on the lines of Düppel[2] in 1864. The real aim, however, has been in most cases the avoidance of losses from the fire of the defence, when these have appeared likely to be severe in consequence of the ground in front of the position being open and calculated to give to the fire its full effect. Examples are to be found in the storming of the lines in front of Seringapatam[3] by Lord Cornwallis in 1792; the attack of the French at the battle of Alexandria,[4] 1801; and the assault on Mount St. Nicholas,[5] in the Schipka Pass, in September, 1877.

Class (*b*).—Attacks on important points preliminary to a general action at dawn have either been undertaken for the sake of surprise, or because the possession of the point attacked has been absolutely necessary to the assailant for making his preparations for battle.

The most celebrated of all night attacks, that in which Marshal Daun fell on Frederick the Great's right flank at Hochkirch[6] in 1758, is an example of the first object; the capture of the cemetery height south of Eylau, which Napoleon wanted to include in his line of battle in 1807, of the second. The surprise of the French outposts on the Heights of Abraham[7] in 1759 is another instance, but the actual fighting was insignificant.

Frederick the Great, Clausewitz, and Marmont all recommend such an attack as the best, if not the only method of making a surprise with large forces, for these, fighting in the dark, are very liable to confusion, but the sudden onslaught on important spots just before dawn will produce confusion on the side of the defence, while the combinations of the attack will have daylight for their execution.

[1] Thorn.
[2] Crousse.
[3] F. of M. Dirom. E.I.M.C.
[4] Walsh, Wilson, Thiers, &c.
[5] Grandin.
[6] Carlyle, Jomini, &c.
[7] Pierron.

Unless, however, the preparatory movements of the battle take place before dawn, a surprise on a large scale is well nigh impossible.

Class (*c*).—Attacks to recover important posts, lost by neglect, or the fortune of battle, during the preceding day, have been very frequent, and must be expected if the side which has lost them has not been thoroughly beaten. There have, indeed, been many failures, but in several cases, where the assailant has not obtained immediate success, the enemy has been prevented establishing himself securely and has been obliged to abandon the captured position next day.

At first sight this class would seem to be much the same as the next, but it differs in one important particular, in that in this class of attack the assailant generally knows the ground better than the defender, which is a circumstance very favourable to the undertaking.

Examples are afforded by the attempt of Charles XII to dislodge the Danes, Prussians, and Saxons, under the Prince of Anhalt from the island Rügen;[1] opposite Stralsund, in 1715; and that of the Allies to recover the Château at Brienne in 1814; also by the recapture of the village of Servigny on the evening of the first day of the battle of Noisseville[2] in 1870; and of the post of Villa Evrard[3] before Paris at the end of the same year.

Class (*d*).—Attacks for the purpose of capturing important posts have been made at night either because the capture has been apparently indispensable, and delay would have given the defence time to improve its position and so have increased the price of success later on; or, because an attack by daylight has been impossible. The capture of the passage of the Iser at Podol;[4] by the Prussians in 1866, is an example of the first; the attempt on Fort Bard[5] in 1800, of the second.

Class (*e*).—Attacks on posts or parties, which in the daytime would receive support from others, are often the only possible method of attaining the desired aim in consequence of the overwhelming strength of the support likely to be brought into action. Their advantages are increased in the present day by the power to maintain the position gained, given by the effect of modern firearms. The examples of this class are particularly interesting. Concerning the attack on the British post at Stony Point[6] in 1779, Washington has left letters,[7] which form an almost complete set of rules for such enterprises. The surprise of Marmont's corps by Blucher's troops in 1814 at Athies,[8] two miles from Napoleon's right, obliged the latter to withdraw from the battle of Laon. Again, the captures of the Russian outpost at Kizil Tepe[9] in Armenia, and of the Turkish position on the Green Hills[10] before Plevna in 1877, are illustrations of the advantages now to be gained in compensation for the risks incurred; in the first, by the time the Russians had learnt what had happened and had collected sufficient forces to attack, the Turks were

[1] R.M.C.
[2] G.O.A.
[3] G.O.A., Vinoy, Ducrot, &c.
[4] P.O.A., Thival.
[5] Marmont.
[6] Carrington.
[7] Upham.
[8] Danilefsky, Pierron, Bourelly, &c.
[9] Bornecque, Melikoff, &c.
[10] Ziekoff.

entrenched and day began to break, and all efforts to recover the lost post were then futile; in the second, the Russians were entrenched before daylight, though the troops covering the working parties had to fight hard during the night.

Class (*f*).—Attacks, made by the weaker belligerent to extricate himself from a dangerous position, depending entirely on surprise, are certainly operations best undertaken under the veil of darkness. In 1828, General Geismar, with 5,000 Russians, was cut off by the Seraskier of Widdin, at the head of a force of 26,000 men and 30 guns. After an indecisive action, the Turks rested for the night round the village of Bojeles-chti.[1] General Geismar, dividing his small force into eight columns, attacked his enemy the same night, completely routed him, and captured arms for 10,000 men, 24 standards, and 424 wagons. The Turkish outpost duties were, of course, carried out with the carelessness characteristic of Oriental armies. During the War in America in 1813, a small British force, under Major-General Vincent, at Burlington Heights, was cut off by 3,000 Americans, who encamped at Stony Creek,[2] seven miles from the British position. Lieutenant-Colonel Harvey, having reconnoitred the ground, advised a night attack; General Vincent entrusted its execution to him, and at the head of the 49th Regiment, and five companies of the 8th Regiment, in all 704 rank and file, he succeeded in putting the Americans to flight, his loss being 23 killed, 136 wounded, and 55 missing.

Class (*g*).—Attacks to effect the passage of an obstacle have been made in the night generally to surprise the defence, while scattered along the line of the obstacle, but the avoidance of losses likely to be incurred during the time of passage has also been a consideration, and this latter object appears to have been particularly aimed at by Napoleon when forcing the line of the Vkra, near Czarnowo,[3] in 1806. This example is particularly interesting, as both sides prepared for the nocturnal combat, and the manœuvres were carried on as if by day. Other instances are the well-known passages of rivers, such as that of the Rhine[4] by Moreau in 1796, of the Limat[5] by Massena in 1799, and of the Danube[6] by the Russians in 1877. These enterprises require long preparation and great secrecy, where surprise is the object, which are difficult conditions to fulfil.

Class (*h*).—Attacks in the dark in continuation of actions begun in the daytime have been made:—

1. Because it has been necessary to strike a blow without any delay; such as the piercing of the French line at La Tuilerie by the Xth German Corps, on the night of the second day of the battle of Le Mans,[7] in 1871, which obliged the whole of Chanzy's army to retreat next day.

2. To increase the result of a victory; such as the attack at Etoges,[8] made by Marshal Marmont, on a body of Russians, after the battle of Vauchamp, in 1814. There can be no doubt that the results

[1] Russell. [2] Brackenbridge, James. [3] Foucart.
[4] Dedon. [5] Limat. [6] Grandin.
[7] G.O.A. [8] Marmont.

of a victory may be greatly increased by a night attack, but such have not been frequent, because, as both Clausewitz and Marmont have pointed out, the large element of chance, always present with them, causes the victor to run the risk of losing the advantages already gained. Marshal Marmont also considers that the propinquity of the two forces is a condition absolutely necessary for success.

3. As a last forlorn hope of obtaining a victory; such as the capture of the Turkish post at Gorni Dubniak[1] in 1877, after repeated failures during the daytime.

The battle of Niagara Falls,[2] between American and British troops, in 1814, is another example which has an especially interesting feature, in that it was fought in the open without any defined position. In it the British, though they eventually remained masters of the field, suffered considerable loss by the fire of their own side, and by the 103rd Regiment, with some of the Sedentary Militia, and two field-pieces, wandering in the dark into the centre of the enemy's army. The confusion was so great that some guns are said to have been unwittingly exchanged.

Class (*i*).—Attacks made to cover a retreat have been frequent, but they are, as a rule, so mixed up with the other manœuvres of a battle, that they are difficult to separate from the whole, and seldom afford any lesson particularly applicable to fighting by night. Two examples may be noticed, the attack of Sacken's Prussian Corps on Marshal Ney, who had taken up a position at the village of Schmoditten, which commanded the Allies' line of retreat from Eylau, in 1807, and the attack made by Napoleon with the Young Guard to protect his retreat at La Rothière in 1814, at which Sacken also assisted, but this time on the victorious side.

Class (*j*).—Attacks made to harass the enemy may be of two distinct kinds—

1. Descents on parts of cantonments or on positions of a more or less stationary character.

2. Attacks made with small bodies in order to deprive the enemy of rest, or to produce confusion in his ranks, *i.e.*, to fatigue, harass, and demoralize his troops.

The first kind do not differ much from any other night combats except in being, as a rule, executed with small bodies of troops. Instances worthy of study exist in the descent on a Spanish outpost position at Villa Velha,[3] on the Tagus, by British and Portuguese troops under Colonel Burgoyne in 1762; in the surprise of a French post at Morsheim[4] in 1794 by Blücher (then a General of Hussars); and in one on Prussian cantonments at Assendrup[5] by Danes in 1864, which last is very fully described with some valuable criticisms by Lieutenant-Colonel v. Boguslawski in his book on minor operations.

The second kind differ from all other night operations in that noise, and therefore firing, are essential on the part of the attack, whereas in all others silence must be maintained as long as possible, and, curiously, is most necessary in attacks belonging to the first sub-

[1] Grandin, Ziekoff, Greene, &c. [2] James. [3] F. of. M.
[4] Pierron. [5] Boguslawski.

division of this class. The advantages to be gained by this form of warfare have been often pointed out, and have been vividly brought to my notice, by letters General Sir James Fitzmayer, R.A., has kindly written to me concerning his Crimean experiences. An illustration is afforded by the battle of Hochkirch in 1758. At this the Prussian Army paid no attention to the firing accompanying the commencement of the Austrian onslaught, as it was supposed to be one of the raids the light irregular horsemen of Hungary were in the habit of making nightly. On the other hand, however, as Captain Bourelly of the French Staff has observed, feints of this sort when repeated too often can provoke on the part of the enemy an increase of vigilance awkward for a real attack.

These combats are the most frequent of all nocturnal enterprises, but those belonging to the second subdivision cannot very well be illustrated, as they are generally too insignificant in their result to receive a detailed account, without which the study of them is not of much use.

Class (*k*).—Surprises of strong places, or attempts to execute them, have been of common occurrence in all wars, especially in those of the end of the seventeenth and beginning of the eighteenth centuries, and many examples will be found in the memoirs of the Marquess de Feuquières.

The reasons for their having been undertaken have been various, but among them the following may be taken perhaps as the most common:—

1. The circumstances being favourable either through the attack having partizans within the place or the garrison being weak, &c. The most celebrated example is the attempt on Cremona[1] made by Prince Eugene in 1702, which is interesting to us, as it is believed that the two regiments who stood firm and offered the first resistance to his victorious advance, though their commanding Officers fell at the very commencement of the fight, were Irish ones in the service of France. In this case there were friends within the walls who arranged for men to be admitted during the preceding day to open the gates, and the look-out on the part of the garrison was exceedingly defective.

Another well-known instance is the capture of Prague[2] in 1741, in which Maurice de Saxe had the largest share. Here the garrison was too weak for the extent of the walls. This case also is an example of the next reason for attempting a surprise, viz.:—

2. To anticipate the arrival of reinforcements for the garrison; for the Austrians under the Duke of Loraine, the husband of Maria Theresa, were hastening up, having been set free by a secret understanding with Frederick the Great.

3. To hasten the end of an investment. An example of this is the attempt by the French on Trichinopoly[3] in 1753, which failed chiefly in consequence of the ignorance of the attack of the ground inside the works. Some of the assailants fell into a pit, and their muskets going off alarmed the garrison.

[1] Feuquières, Pierron, &c. [2] Broglie, Saxe, &c. [3] Orme.

4. In consequence of the want of time or means for conducting a siege or investment. Thus when Sir John Keane arrived before Ghuznee[1] in 1839 the place was found to be stronger than expected; the army, however, had no battering train, and was running short of supplies. A *coup-de-main* was the only way out of the difficulty. The attempt was successful. Another well-known instance is our disastrous repulse at Bergen-op-Zoom[2] in 1814. An example of an attempt and failure on a large scale occurred in 1877, when the Russians attacked the city of Erzeroum[3] in consequence of the season preventing any siege operations being practicable. The failure was in this case due to defective arrangements and ignorance of the ground.

5. Because the possession of the post has been of importance, and the carrying of it without surprise and the cover of night has promised very heavy loss. The Prussians almost succeeded in capturing the fortress of Bitche[4] in 1793, and probably would have done so if their ladders had not been too short. The British troops captured the important fort of Niagara[5] in America in 1813: entering the gates, which were opened for the relieving of the outposts.

Enterprises of this class have often been successful, but Wellington, and also Marshal Marmont, considered they should not be so if the moral of the garrison be good. The former, writing of the attempt on Bergen-op-Zoom, says: "Sir Thomas Graham is very unfortunate, However, night attacks upon good troops are seldom successful."

Class (*l*).—Assaults on fortresses, after a certain amount of siege operations, afford more examples of nocturnal fighting on a large scale than any other class of combats.

The reason for this is to be found in the conditions of this kind of warfare, which give both sides time and opportunities for thoroughly "learning the ground," and of obtaining precise information on all points connected with the enemy, and at the same time make attacks by daylight particularly costly on account of the previous preparation of the defences and field of fire. The assault of Bender[6] by the Russians in 1770, and those of Ciudad Rodrigo and Badajoz[7] in 1812, are well known instances. Wellington's orders for the last two must always serve as examples. and a study of the details of execution is very instructive, showing how very small are the incidents on which depend success or failure.

In our own day has occurred the brilliant feat of arms which, in a few hours, delivered Kars[8] with its garrison of 23,000 men protected by twelve forts into the hands of a Russian army whose infantry only exceeded that of the defence by 7,000 men. This, by the enthusiastic advocates of night attacks, may perhaps be compared to the long weary investment of Plevna with its many repulses, but it should be remembered that in the last case the garrison was a large field army actively led, which would have had more chance of surprising and defeating the attack after its first onslaught, than the latter could

[1] Durand, &c. [2] Cust, Jones. [3] Ziekoff.
[4] Cust. [5] James. [6] F. of M.
[7] Napier. [8] Greene, Ziekoff, &c.

ever have had on its side to start with. It may, however, be safely said that no attack on Kars by day could have succeeded without a much greater loss.

Class (*m*).—Sorties have naturally been more frequent even than assaults, but in most cases it is difficult to discover their particular object, and so to decide whether they have been successful or not. Those made from Gibraltar[1] in 1781, and from Bayonne[2] in 1814, afford instances of the employment of large forces at night, and on a smaller scale those at Pondicherry[3] in 1760, and Toulon[4] in 1793, are very interesting.

Class (*n*).—Actions arising from the chance meeting of troops in the night have been placed last, because they generally occur between insignificant parties, are seldom recorded in detail, and can by their nature be subjected to no rules. In 1863 a cavalry combat took place near Spottsylvania between the 6th New York Cavalry and FitzHugh Lee's Confederate Brigade under General Stuart; the Federals succeeded in escaping, and after the first onset there was much confusion amongst the Confederates, as their regiments charged each other.

When the bodies concerned have been of any size, the object of both adversaries has been to break off the engagement as quickly as possible to await daylight. Such instances are to be found in the encounter of British and American troops before the battle of Camden in 1780, and one between the armies of Suwarrow and Macdonald during their struggle on the Trebbia in 1799.

All the most eminent commanders and military writers, who have expressed their views on the subject, have recognized that the chief characteristic of night fighting is the tremendous *rôle* in it played by chance, and while admitting the possibility of great results, have regarded it with disfavour, and have considered success to be the exception and not the rule. The opinions of Napoleon and Wellington, as expressed concisely, have been already quoted. Frederick the Great said in his instructions to his Generals: "For my own part, I am determined never to attack by night, on account of the confusion which darkness necessarily occasions, and because the major part of the soldiery require the eye of their Officers and the fear of punishment to induce them to do their duty."

Military science, after exposing the greatness of the risks of these enterprises, will require a complete justification for running them. This justification is to be sought in—

I. Necessity.

II. The probability of success, or in the fact that

III. The value of the advantages to be gained far outweighs the risk incurred.

I. Necessity, of course, exists in all the cases where the adversary is immeasurably superior in numbers, and there are no means of avoiding a conflict.

[1] Drinkwater. [2] Cust, Napier, &c. [3] Orme. [4] F. of M.

Frederick the Great[1] said of the attack made by Charles XII on the Prince of Anhalt at Rügen, in 1715, "The King of Sweden had reason for so doing, as daylight would have discovered the weakness of his army. He came with 4,000 men to attack five times the number, and of course was defeated." The affair of Bojeles-chti[2] in 1828 rather weakens the "of course."

Necessity, also as a matter of course, justifies attacks made to protect retreats.

It may also form part of the justification of many other classes of night combats, through the undesirability of delay, or the greatness of the probable loss in daylight; but in these cases, if failure ensues, other conditions are required to make the plea complete.

II. The probability of success. This depends on whether the circumstances are favourable or unfavourable, and a decision on this point involves many considerations, whose relative values are almost always different in each individual case.

Among the favourable circumstances the following may be noted.

1. That the discipline and moral of the attacking troops are good. This is next to a necessity, for all attacks must be preceded by marches and, as Sir Archibald Alison told the Highland Brigade in Egypt in his farewell address, nothing is so severe a test of discipline as a night march. One would have thought that if troops were ever disciplined those of Frederick the Great were, but as before noted it was his distrust of their qualities in this respect that he gave as one of his principal reasons for never undertaking a nocturnal combat.

The confusion, too, always produced by darkness, and the difficulty of supervision by the leaders, and of directing combined movements, will invariably cause the fighting to assume an individual character, which demands a high *morale*. The qualities requisite for this style of combat belong in different degrees to different nations.

2. That the discipline and *morale* of the enemy's troops are bad. The effect of a night alarm on bad troops is sometimes so great that it may almost be a full justification for the undertaking.

At Le Mans,[3] in 1871, when the Germans had pierced the line at La Tuilerie, no efforts of the French Generals could induce their half-formed and badly armed, clothed, and fed regiments to close with the victors. Of the effect of the Saxon attempt to recover Villa Evrard before Paris in 1870, which was not an immediate success, General Vinoy has written: "The night alarm had caused, at a considerable distance from the locality, a regular panic among the marching battalions of the National Guard, which were in reserve in the villages of Fontenoy-sous-Bois, Neuilly-sous-Bois, Neuilly, Plaisance, and Rosny. Although they were separated from the enemy by the village of Neuilly-sur-Marne, protected by the battalions of Gendarmerie, and covered by the plateau of Avron, a large number of National Guards were terrified at the simple apprehension of danger; the idea of an attack, as yet impossible, which might reach it, caused the 200th Battalion of the National Guard to fly first to Fort Rosny, then to the glacis of the enceinte, and lastly into Montmartre itself. Other battalions manifested like symptoms of discouragement and fear, and part of their men dispersed in all directions."

3. That the adversary's outpost system is defective, or its duties are badly carried out. This appears an essential condition for a surprise on a large scale, and is a fault characteristic of certain nations and commanders.

[1] Frederick. [2] Russell. [3] G.O.A.

At Athies Marmont allowed his young troops to spread in search of food and shelter on the cold March evening after their long march. His guards were inadequate or wanting, and, in consequence, Blucher fell on his detached force with foot and horse, capturing over 2,000 prisoners and 45 guns, and gaining a superiority which compelled Marmont's great master to retire from the field as soon as he received news of the disaster.

At Cremona, Trichinopoly, Hochkirch, Stony Creek, Bojeles-chti, Assendrup, Kars, in great and in small affairs, this defective look-out has been the first cause of the assailant's success.

4. Any other carelessness or laxness on the part of the defence.

At Cremona,[1] in 1702, a number of Prince Eugene's soldiers succeeded in passing into the town during the preceding day disguised as peasants, and no sentries were found on the walls. At Prague,[2] in 1741, Maurice de Saxe and M. de Chevert, by a personal reconnaissance just before the assault, discovered a heap of manure and rubbish against the escarp wall, by which the column mounted. At Fort Niagara,[3] in 1813, the Americans left the gates open while the outposts were relieved, and the British having captured most of these, entered with the fugitives. At Ghuznee,[4] in 1839, the Afghans, though they lighted the top of the walls, left the foot in darkness, and so the engineers blowing in the gateway escaped detection.

5. Proximity of the enemy, inasmuch as it lessens the risk of confusion and wandering on the part of the columns of the attack during the preceding advance, and causes the defence to have little time for its preparations. Marshal Marmont regarded it as a condition essential for success, but there are several instances of night attacks having been made successfully after considerable marches.

At Seringapatam,[5] in 1792, Lord Cornwallis, with over 8,000 men, had 4 or 5 miles to cover before reaching Tippoo Sultan's position. At Stony Creek,[6] in 1813, the small party of British troops had a march of 7 miles; and at Fort Niagara,[7] the same year, the force had to cross the river in the dark, 3 miles above its destination.

6. The state of the atmosphere, which should be dark and rainy or foggy when the expedition is on a small scale, and surprise is the object, but clear and moonlight when large bodies have to be employed, and the chief reason for choosing night for the enterprise is the avoidance of loss by fire.

Writing to Brigadier-General Wayne, concerning his projected attack on Stony Point[8] with a small force in 1779, Washington said: "A dark night, and even a rainy one, if you can find the way, will contribute to your success." The brilliant victory at Kars and the miserable failure at Erzeroum in 1877 are examples of large enterprises undertaken, the one on a moonlight, the other on a dark night.

At Skobeleff's attacks on the Green Hills[9] before Plevna in 1877 a thick fog enabled the concentration of the detachments to be carried out in perfect secrecy.

7. Concealment being afforded for the preliminary movements and advance by the features of the ground or by woods, enclosures, &c.

At the capture of the village of Danjoutin[10] by the Germans during the siege of Belfort in 1871 a fold of ground and woods concealed the attack almost until the final rush. At Hochkirch, 1758; the passage of the Limat, 1799; Marmont's successful enterprise at Etoges in 1814; and at the descent of the Danes on the cantonments at Assendrup in 1864, woods favoured the undertaking.

[1] Feuquières. [2] Saxe. [3] James.
[4] Durand. [5] Dirom, &c. [6] James, &c.
[7] James. [8] Upham. [9] Ziekoff.
[10] Wolff.

8. In his comments on the affair of Assendrup, Lieutenant-Colonel v. Boguslawski has pointed out what a favourable circumstance it is if the natives of the country are friendly, as it diminishes one of the greatest dangers—that of information reaching the enemy enabling him to surprise the attack instead of being surprised himself.

In addition to the above-mentioned circumstances, favourable to all night attacks, the three following have great influence in those made on "localities."

9. The existence of a body of friendly-disposed inhabitants, or the possession of some small part of the place.

Thus, at Cremona, in 1702, a friendly priest hid no less than 600 of Prince Eugene's men in his chapel and the cellar of his house; and when the French took the village of Servigny late in the evening of the first day of the battle of Noisseville in 1870, Lieutenant Lauterbach concealed his company in a small vineyard at the north-west side of the village, and having waited patiently until the German counter-attack was made in force, overwhelmed the nearest French troops with a vigorous file-fire on their right flank, which materially assisted the recovery of the post.

10. Any imperfection in the works of the defence, such as bad repair, the possibility of escalade, or the absence of flanking fire.

At Cremona there were no grills over the openings through which the surface drains communicated with the ditch. At Zierenberg,[1] in 1760, there was more than one gap in the wall. At Kars the forts were not secure against escalade and had no flanking defences.

11. The strength of the garrison being too small for the extent of the ramparts.

This played an important part in the taking of Prague in 1741, and of Schweidnitz[2] in 1761; and formed the chief ground for expecting success in our attempt on Bergen-op-Zoom in 1814.

It is, perhaps, unnecessary to say that circumstances which are the opposite to those just enumerated are to be regarded as unfavourable, and that sometimes the simple absence of them must be so likewise, but one—the want of discipline or of a good spirit in the attacking troops—deserves notice for three reasons: 1st, desertion is generally of common occurrence in an army with this defect, and consequently secrecy is difficult to obtain. 2ndly, from the nature of things the effect of a surprise must always be greater on the assailants than on the defenders, and bad troops cannot be expected to withstand it. 3rdly, such troops require close supervision by their Officers, which is impossible in the dark.[3]

Generally speaking, favourable circumstances are such as assist in the execution of the prepared plans, the effecting of a surprise, and the production of confusion in the ranks of the defence; and unfavourable circumstances those that hinder the attainment of these aims. It is difficult to particularize further, but the following are some of the causes that have most frequently led, or nearly led, to failure:—

1. Losing the way during the advance, and want of knowledge of the ground or locality.

[1] F. of M. A. R., 1760. [2] Carlyle, Jomini, &c. [3] Frederick.

In 1799, Wellington (then Colonel Wellesley) lost his way in making an attack on an outpost before Seringapatam. At the battle of Alexandria[1] the left column of the French left wing bore too much to the right, and in putting it straight again General Lanusse was mortally wounded; his fall caused the attack to slacken, and the first light of day gave the British a chance of firing with success. At Erzeroum,[2] out of four attacking columns only half of one reached its proper position.

2. Mistakes concerning the destination of a column, or the point of attack.

In M. de Lally's sortie from Pondicherry in 1760, the left column was to halt at certain villages and await the signal for the simultaneous attack of three more, when it was to fall on the rear of the right flank of Colonel Coote's camp, which would have been at a short distance from the halting place. By some unexplained mistake it halted one mile short of its destination, and, when the signal was given, had not time to reach its proper place before the other columns were beaten. At Seringapatam, in 1792, Lord Cornwallis's right column attacked the strong Mosque redoubt it ought to have left on its right. This mistake entailed terrible loss and prevented the column co-operating with the others. At Badajoz, again, the Light and Fourth Divisions, moving against the main breach, mistook an unfinished ravelin for it, and mounting into it got mixed; they suffered terribly from the French fire and lost all cohesion. The mistake was rectified as far as possible, but with the shaken troops the assault was unsuccessful, though Napier's vivid account will ever be a monument to those who fell in the desperate struggle.

3. The presence of unknown obstacles or defences.

At Rügen Charles XII hastened to attack the Prince of Anhalt before the latter could establish himself in the island, but he, knowing his adversary's character, surrounded his camp with a ditch and *chevaux-de-frise*. Charles arrived without any noise, but the Swedes speaking to one another while removing the *chevaux-de-frise* alarmed the camp, and the consequence was their severe defeat. At Trichinopoly, 1753, some of the assailants fell into a pit, and their muskets going off alarmed the garrison. During the French sortie from Bayonne in 1814 a detachment of the 38th Regiment, under Captain Forest, were able to prevent the complete capture of the village of St. Etienne by holding a house, rendered defensible by some ready expedients. In an account of the attempt by the Afghans, in 1842, on Kandahar,[3] after describing the measures taken to repulse the fierce onslaught, the following occurs: "But more serviceable even than these movements was one which opposed a solid obstacle to the entrance of the besieging multitude. From the commissariat godowns a number of grain-bags were brought down and piled up at the burning gate. About nine o'clock the gate fell outwards, and then a party of Ghazies climbed the lofty barricade of grain-bags as men weary of their lives, then fell dead and desperately wounded beneath the heavy fire of our musketry. Spirited was the attack; spirited the defence. The fate of Kandahar seemed to tremble in the balance. For three hours the Ghazies renewed, at intervals, the assault upon the gateway; but they could not make good their entrance to the city, and at midnight drew off in despair."

4. Uncertainty as to the position of the other side.

The incident of a large party of British troops wandering in the dark into the middle of the American force at the battle of Niagara Falls has already been mentioned. An attack on Turkish posts at Berdek[4] in 1877 nearly came to grief from this cause. This last example is the one selected by Captain Roodzinsky to illustrate points in the offensive tactics of night fighting in his valuable pamphlet on "Marching and Fighting by Night," published at the Staff Printing Office of the Wilna military district in 1881.

5. Want of energy, or stupidity of individuals taking part in the enterprise.

[1] Thiers. [2] Ziekoff. [3] Kaye. [4] Roodzinsky.

At Mantua,[1] in 1793, a *coup-de-main* was attempted on an outwork; 300 men were dressed up in the uniform of one of the regiments of the garrison and were to pretend to be driven in by a French attack, and so gain admittance into the work. The command was given to an Italian who had once served in the Austrian Army, and had deserted. He, not much relishing the chance of being taken prisoner and hung, took so much time about the preliminary sham battle, that the Austrians were not deceived. At the storming of Ghuznee, the retreat having been sounded in consequence of its being thought that the gate was not blown in, Durand, of the Engineers, who knew that it was, and that every moment was precious, asked an infantry Officer to let his bugler correct the mistake, but the latter would not take the responsibility or allow Durand to do so, and insisted on higher authority being obtained, causing a delay which might have been fatal.

6. The most frequent cause, however, of the assailants being defeated or checked has been the alertness, good behaviour, and skilful leading of the troops for the defence. Cremona, Bergen-op-Zoom, Düppel,[2] Cuddalore,[3] and numberless other affairs are all examples of this.

Marshal Marmont, in his book "De l'Esprit des Institutions Militaires," says of the surprises of strong places:—"But it is necessary to bear well in mind that, even with the most favourable elements, it is still possible to fail, if the garrison thus surprised is animated with a good spirit, if the soldiers are endowed with an energy which hinders them from calculating at the first moment the disproportion of their strength and the danger, and causes them to think only of defending, and in no way of saving themselves. Then each soldier fights where he stands, the smallest parties take post in all directions—at the door of a house, at the corner of a street, behind a vehicle; they thus unexpectedly disarrange the combinations of the enemy by suspending the advance of the foremost troops. Here there is a first chance of safety for the place. Then the chances increase with every moment; other troops form in imitation of the first, and soon the garrison, being all a-foot and freed from that powerful moral effect which the unforeseen always produces, acts in combination, and comes victoriously out of a struggle in which at first it seemed that it must succumb. In such circumstances the soldiers who are by chance first placed in the presence of the enemy should have no thought but for the safety of their comrades, and of the glory which always accompanies a grand act of devotion."

In addition to the above, there are the same causes which lead to disaster in the daytime—such as the fall of leaders, sudden reasonless panic amongst the troops of the attack, &c., &c.—whose effects are increased by the confusion produced by darkness.

III. The third condition on which a night attack may be justified, viz., that the advantages to be gained far outweigh the risks incurred in its execution, cannot, except in one instance, be analyzed without an answer to the question, What are the advantages of night attacks?

The one case excepted is when the force risked is very small compared to the whole, and circumstances render it impossible, or very unlikely, that the demoralization of failure will spread to the troops not actually engaged. The completeness of this justification is so self-evident as to require no proofs, though there are ample to be found in military history.

It appears that the advantages that are to be gained by, *i.e.*, the motives, viewed as distinct from the causes, for attacking by night instead of by day may be divided under three heads, which in an ascending scale of importance at the present day are:—

[1] Marmont. [2] Crousse. [3] C. of V. Hamont.

1. Gain of time.
2. Surprise.
3. Avoidance or diminution of loss.

1. The gain of time results from various causes. It is very clear, if works of approach are rendered unnecessary in consequence of a successful assault.

If a position necessary for the preliminary arrangements of a battle is seized during the previous night, it is likely to save much time on the actual day; as, for example, the taking of the cemetery hill at Eylau in 1807.

The side attacked being unable to estimate the amount of force employed compared to its adversaries' available strength, but impressed by the energy displayed in continuing or commencing an action in the night, may be induced to suspend its movement, and so be anticipated at the common goal or obliged to accept battle. The energy of General v. Werder's fight at Villersexel[1] in 1870, continued long into the night, caused Bourbaki to suspend his advance for a short time, and, in consequence, the Germans reached the line of the Lisaine before him. In 1878 a small body of Russians, consisting of six battalions, two regiments of dragoons, and two horse artillery guns, by a bold night attack on the Turks in the village of Karagach,[2] stopped the retreat from Philippopolis, and gained time for the rest of the Russian army to arrive. The result was the battle of the 17th of January, which finally drove the Turks in disordered masses into the Rhodope mountains.

A position will take less time to recover immediately after its loss than when the enemy has established himself in it.

Time is also gained in the actual combat, for all the preliminary stages, now so long, are entirely eliminated, and the final rush is reached at once.

The gain of time is of course the motive for all attacks made to cover a retreat.

2. Surprise. This formerly was the principal aim of all enterprises undertaken at night. Clausewitz begins his chapter on them thus:—"Fundamentally, every night attack is only a more vehement form of surprise," and continues throughout with this view of them in his mind.

The advantages, too obvious and too well known to require any enumeration, of a successful surprise always heighten the *morale* of the side achieving it, and produce a demoralization on the other, which may have scarcely any limits. "The more an attack resembles a surprise, the more sure can one be of success."

This motive will still be present in every night attack; for even in those prepared for by both sides, such as the passage of the Vkra in 1807, there must exist opportunities for stratagem and deception, and partial surprises; but day by day, as firearms are improved, the third motive outdistances the others more and more.

3. The avoidance or diminution of loss is attained by fighting at

[1] Thival, &c. [2] Fédoroff.

night in more ways than one. The movements and numbers of the attack being concealed, the defence cannot deploy all its strength against it. The blows and combinations of the defence may be paralyzed by the demoralization produced by surprise and the confusion due to darkness. The desired position may be gained before the defenders' supports can arrive. When attacks are made to recover a post immediately after it has changed hands, the defence probably has not had time to examine and develop the whole of its resources.

The principal cause, however, that losses have been less by night than by day, is that the accuracy of all sorts of fire is destroyed by the want of sufficient light to aim by, especially with regard to giving the proper amount of elevation. This effect, which is felt on moonlight as well as on dark nights, has increased in importance as the weapons have become more accurate, but at the same time have required more delicate manipulation. Now, however, it is being diminished by the flatter trajectory of the projectiles, which renders any adjustment of the sights unnecessary for effective ranges, and also by the increased rapidity of firing, which makes it possible to launch a perfect storm of lead over all the field of fire.

Under these circumstances it would seem that the avoidance of loss will have to be sought in the future chiefly in the shortness of the combat, and so surprise will again increase in importance, though it will be a means to the end, and not the chief motive for fighting by night.

The losses incurred in the present day in attacking positions held by well-armed troops are so great that to avoid, or lessen, them may well be a complete justification for running all the risks attending operations carried on in the obscurity of night, if these risks have been properly considered and provided against. History, however, affords so many examples of the danger incurred that no motive can be a valid excuse if failure results from neglect of its lessons.

Night attacks having for the sake of clearness been divided into classes according to their various characteristic features, and their aim and the grounds on which they can be justified having been examined, the subject can now be considered in its relation with the attack and the defence.

Preliminaries of the Attack.

When an attack by night is contemplated, the first thing to be done is to gain every possible information concerning the enemy, and the ground must be thoroughly learnt. This must be accomplished by using all the sources of information available, but it must be borne in mind that "what the assailant knows of the defensive previous to a night attack is seldom or never sufficient to supply the want of direct observation." It is only the imperative necessity of maintaining complete secrecy or of acting without any delay that can justify a night attack being undertaken without a previous reconnaissance made either by the commander in person or by trusted Officers.

This may be a strong statement, but it has a strong foundation.

Frederick the Great in his instructions to his Generals says—

"The nature of the country and the position of the enemy should be perfectly well understood prior to the formation of any plan.

. . . . . .

"Be particularly careful to conceal your design, for secrecy is the soul of all enterprises."

The Duke of Wellington, after miscarriage of the enterprise led by him before Seringapatam in 1799, wrote to Lord Mornington—

"I have come to the determination, when in my power, never to suffer an attack to be made by night upon an enemy who is prepared and strongly posted, and whose posts have not been reconnoitred by daylight."

If the commander cannot make the reconnaissance himself, as did Lord Cornwallis at Seringapatam, 1792, Napoleon on the Vkra, the leader of the attack should do so, as in the cases of Maurice de Saxe at Prague, Lieutenant-Colonel Harvey at Stony Creek in 1813, and Captain Manstein at the capture of the village of Danjoutin before Belfort in 1871. If this is not possible the Officer who has had most opportunities for gaining information and knowledge of the ground should at least be consulted. Washington, writing finally to Brigadier-General Wayne about the descent on the British post at Stony Point[1] in 1779, said: "You are at liberty to choose between the different plans on which we have conversed. But as it is important to have every information we can procure, if you could manage in the meantime to see Major Lee, it may be useful. He has been so long near the spot, and has taken so much pains to inform himself critically concerning the post, that I imagine he may be able to make you acquainted with some further details. Your interview must be managed with caution, or it may excite suspicion."

As secrecy is so important, for surprise is ever advantageous, it is clear that the reconnoitring party should be as small as possible, but if no Officers with a perfect knowledge of the locality are available as guides, a certain number of properly qualified ones should be included who may either guide the columns themselves or act as checks on the natives employed for this purpose. Such a check is necessary, as the natives, even if faithful, are, as a rule, unaccustomed to military movements, and are liable to become confused.

No reconnaissance at a distance will suffice.

Washington, in the letters already referred to, says: "The three approaches here spoken of should be well reconnoitred beforehand, and by persons of observation. Single men in the night will be more likely to ascertain facts than the best glasses in the day." Our modern telescope makers would probably claim to have improved on the glasses of last century, but the attempt of the Russians on Erzeroum in 1877 is an example that the maxim still holds good. Here, according to Major-General Ziekoff's account, "all the commanders of columns and detachments took part in a reconnaissance on the 27th October (8th November). During this the routes laid down for the columns appeared so clear from a height within musketry range of the town that it was considered impossible for them to lose the way. . . . .

"The same afternoon Colonel Voïnoff, Acting Chief of the Staff to No. 1 Column, from a point within cannon-shot of Top-dagh, explained to Colonel Prince Amiradjiboff and all the Officers of the Baku and Elizabethpol Regiments all the details, and pointed out to them the positions of the various fortifications and buildings."

General Ziekoff goes on to say:—

"It was soon to be proved that this knowledge of the ground gained by means of a bird's-eye view with a *vivâ voce* explanation was quite a different thing to that

[1] Upham.

gained by experience and habit, by the help of which a man can sometimes, as it were by instinct, find his way in complete darkness."

The Officers intended to act as guides should be, as said above, properly qualified, and in addition to the usual qualifications for reconnoitring duties should have one only to be obtained by practice; it has been defined by Captain Roodzinsky to be the faculty of recognizing during darkness objects, noted in the daytime, by their profiles against the sky-line.

When it is impossible to make a reconnaissance without the risk of the design being discovered and complete secrecy is necessary, agents and spies have to be used, but, even if their fidelity is unquestionable, the importance of full and accurate information is such that every means should be employed to verify their statements. If use is made of deserters or of natives whose fidelity is doubtful, it is necessary to regard their information with the greatest suspicion unless very strongly corroborated, for as the assailant must principally base his plans on the supposed dispositions of the defender, they will be completely disarranged if his supposition has been made on false grounds.

It is by no means intended that such information should never be used, for history affords many examples of successful night attacks which have either been founded on the knowledge gained from such sources or have been materially assisted in their execution by deserters.

Thus at Stralsund[1] in 1715, a Swede fell off the ramparts into an arm of the sea, which, to his astonishment, turned out to be very shallow. He immediately deserted, and the result was that the besiegers captured the outer line of defence, and very nearly entered the town. At Prague, 1741, Ghuznee, 1839, Kandahar, 1842, and many other places the information of deserters proved of great value; and in the attack made by our troops on the entrenched camp at Cornelis, Java, in 1814, where a reconnaissance was impossible, a deserter, who had marked the path in anticipation, acted as guide to the principal column.

Secrecy is, as a rule, so important that it cannot be too much insisted on. Its observance may be said to have been one of the principal causes of success in most cases, and there are numberless examples of disaster resulting from its non-observance. It is, perhaps, needless to say that the plan of attaining it which has proved most successful has been to communicate the intention of making the enterprise to as few persons as possible, but it will not be out of place to quote one instance illustrating the care that should be exercised in the choice of the persons chosen for the confidence. At Ghuznee, 1839, the intention to attempt a *coup-de-main* was communicated to the Political Envoy, "who, ignorant or heedless of the possible consequences, permitted the matter to become generally known in the Shah's (our protégé's) camp, from whence it spread to the place, and caused the garrison to be all night on the alert."

This was the night before the actual assault. The account is taken from Sir Henry Durand's "First Afghan War."

The difficulty of maintaining secrecy, of course, increases when extensive preparations have to be made to overcome obstacles, &c.;

[1] R.M.C.

but the passages of the Rhine, Limat, and Danube before quoted prove that it is not insurmountable. Sometimes it will be necessary to allow the "departments" attached to the army to remain in ignorance, as their preparations often take considerable time, and the more complete they are the more difficult is it to conceal their object, while secrecy becomes more and more necessary as the time for action approaches. "As it is in the power of a single deserter," Washington wrote, "to betray the design, defeat the project, and involve the parties in difficulties and danger, too much caution cannot be used to conceal the intended enterprise till the latest hour from all but the principal Officers of your corps, and from the men till the moment of execution. Knowledge of your intention, ten minutes previously obtained, blasts all your hopes." . . . .

Schweidnitz, 1761; Bayonne, 1814; and Kandahar, 1842, are instances of the defence receiving information of the intention of the assailant.

If it appears that a night attack is feasible and there is a sufficient hope of success, the next thing is to carefully prepare the plans for its execution. These, of course, must depend on circumstances, but the following rules[1] have to be remembered:—

I. The chief characteristic of all plans should be their simplicity.

Combinations depending on the co-operation of many columns are almost sure to fail—

As is evidenced by history, for the fact of such combined movements forming an essential part of the plan led to failure at Cremona, 1702; Pondicherry, 1760; Alexandria, 1801; Bergen-op-Zoom, 1814; Mount St. Nicholas, 1877; and Erzeroum, 1877.

II. If it is absolutely necessary to attack at more than one point at once, the separation of the parties should be put off as long as possible.

This is for the sake of simplicity, and also to enable the Officer in command of the whole expedition to supervise the different columns, for subordinates are apt to be wanting in perseverance if unforeseen difficulties are encountered.

Thus, at Washington's celebrated raid on the Hessians at Trenton in 1776, one of his columns finding the river difficult to pass gave up the attempt; its commander, Colonel Cadwallader, writing to his chief, "I imagine the badness of the night must have prevented you from passing over as you intended." The march of General Hill on Arroyo Molinos in 1811 is a good example to follow.

III. The numbers employed should be as small as is consistent with the requirements of each particular case.

This is to ensure simplicity and secrecy, and to avoid "putting too many eggs into one basket."

It is the power for mischief given small bodies by darkness that has been one of the principal recommendations of nocturnal enterprises, and especial weight has been accorded to it by Washington and Marshal Marmont, whose opinions are re-echoed by later writers.

[1] It is not intended here, or elsewhere, in these lectures to lay down hard and fast rules for the conduct of nocturnal tactics, as to do so would be absurd. These so-called rules are only considerations that should be duly weighed in preparing the plans, and must be modified to suit the circumstances of each particular case.

IV. Feints and false attacks are nearly always useful, but must be made with sufficient energy and force to attract serious attention.

An example of a very successful false attack is to be found in the capture of the outworks at Stralsund in 1715 before alluded to. Here the besiegers distracted the attention of Charles XII from the real assault on the side of the sea by making an energetic advance with a column of 2,000 men along a causeway leading to the works from another direction.

On the other hand, the attack of the French dromedary corps on the English left at Alexandria was so feeble that its true nature was quickly discovered.

Ruses and tricks, though resembling feints and false attacks in many ways, are apt to introduce a certain amount of complexity into the plans, and are accordingly objectionable. They have not often succeeded, or been of much use.

At the passage of the Vkra in 1807 Napoleon had damp straw burnt at a point some distance above the real crossing place to lead the Russians to fear an attack on their right flank, a few light infantry and six guns being placed behind the screen of smoke to heighten the effect by their firing. At Kandahar in 1842 the gate was set on fire by brushwood placed against it by an Afghan pretending to be a simple seller of firewood, who was unwittingly allowed to approach close up to the walls while demanding admittance. The Marquess de Feuquières, pretending to be a friend, once engaged the enemy's Officer of the guard in conversation, while one of his men made arrangements to blow in the gate under his very nose.

V. Every party should have a fixed destination, or limit to its advance.

If it has not, and the enemy is not found in the position expected the result must be confusion, which may enable the defence to successfully assume the offensive. Also, if the lines of advance converge, the columns may cross each other if not stopped in time.

Under favourable circumstances, however, the main attacks may be directed to push beyond their original destinations, and false attacks to become real ones with one important proviso, viz., that this extended action shall only be in the first instance attempted by small detachments unless the leaders are perfectly sure of their ground, and the danger of confusion and mistakes very small.

VI. Supports are always necessary to restore impetus to the advance, if it is checked, and to form a nucleus for the re-establishment of order after the assault.

Captain Roodzinsky strongly insists on the necessity of a general reserve, which is only an extension of this rule, which certainly applies to all cases but that of an attack made on a strong place from many sides at once, when the use of a single reserve is not very apparent.

VII. If successive positions have to be carried, arrangements must previously be made for securing those first captured.

This will generally be effected with special reserves, as was done at the surprise of Schweidnitz in 1761, where the Austrians had four columns, each composed of four battalions, two of which were not to move until the first line of defences had been carried by the other two; then they were to occupy them, and the leading battalions were to resume their advance and attack the inner wall.

VIII. The routes selected should be easy to recognize, and as short and direct as circumstances allow.

This is not only necessary to facilitate the arrival at the appointed destination at the proper time, but also to simplify the rallying of the troops in case of failure, for as a rule the line of flight or retreat will be in the same direction as the last part of the advance, and beaten troops will not have time or coolness sufficient to follow a circuitous path.

The plans being settled, orders have to be framed to direct their execution. Simplicity must again be the chief aim, both to avoid mistakes and to enable the directions to be easily carried in the memory.

Without a doubt the best guarantee that a Staff Officer shall not omit important points is, as in all other branches of the art of war, his possession of a thorough knowledge of good models, and there are many existing of orders issued for night attacks. All examples are useful, whether good or bad, if only properly studied, but among the former the following are especially worthy of notice:—

Washington's letters and instructions for the descent on the post of Stony Point, in 1779.[1]

Lord Cornwallis's orders for the assault on the lines before Seringapatam, 1792.[2]

Wellington's orders for the storming of Ciudad Rodrigo, in 1812.[3]

Laudohn's dispositions for the surprise of Schweidnitz, in 1761.[4]

Napoleon's orders for the passage of the Vkra, in 1806.[5]

The orders of the Grand Duke Michael Nicolaïwitch for the storming of Kars, in 1877.[6]

The orders can be divided under various heads, and these again can be grouped into two classes, viz.: orders concerning the preparation; and orders concerning the execution.

In the first class may be placed:

1. The general idea.
2. The distribution of the force and its equipment.
3. The route, destination, duty, and the amount of independence of each column.
4. The hour of departure, and that for commencing certain actions.
5. Countersigns, watchwords, distinctive badges, and signals of all kinds.

The second class contains:

6. Any details of execution that the absence of practice in nocturnal warfare or the peculiar circumstances require, and those the importance of which renders their continual repetition desirable.
7. Measures to be taken after success.
8. Measures to be taken in case of failure.

The first class will alone be considered for the present, the second being left until the study of the execution of the enterprise is reached, as in this latter case an examination of the conditions under which the orders have to be carried out will afford the best explanation of what each head should include, and the reason for its presence.

[1] Upham. [2] Dirom. [3] Jones.
[4] Jomini (?) [5] Foucart. [6] Greene.

It may be as well to remark before considering any of the orders in detail, that, although one or more will generally have to be given under each of the above headings, yet the necessity for secrecy and conciseness requires that they should be so arranged that individuals need only receive those which concern themselves. Care, however, must be taken that sufficient Officers with each detachment are fully acquainted with the plans, so that if the original leaders are disabled they can be immediately replaced.

At Cremona, 1702, and at Bergen-op-Zoom, 1814, the fall of Officers commanding columns upset the plans, in the first case, thus: "The Officer commanding the second column was to fire rockets when he had seized the Po gate, as a signal for the attack of the Modena column on the bridge-head. He alone was entrusted with the secret, and he was killed outright at the first discharge. The Officer commanding the Modena column alone knew the destination of it, and, while waiting for the signal to advance, lost his leg by a cannon-shot from the bridge-head, and was unable to give any instructions afterwards."

1. The general idea must be explained as concisely as the necessity for clearness will admit; and in the first instance need only be communicated to the principal Officers destined to lead the attack; but everyone in the force should have some notion of it before the movement actually commences.

2. The distribution of the force, of course, must depend on circumstances, as also does its equipment. By equipment is meant the provision of means for overcoming obstacles, such as hay-bags for filling ditches, scaling ladders, fascines, gabions, and tools for entrenching the captured position, &c.

The delay that may be caused to columns advancing in the dark by unexpected obstructions is so great, and the advantages to the defence gained so manifold, that such are very likely to be met with, and in consequence a detachment of engineers should form part of every column. In the case of storming works armed with cannon, a small party of artillery should also be joined to each column of the real attack in order to spike them; or, if it is probable that they will be capable of being used against the defence, a larger party for that purpose.

Cavalry and guns had better not be mixed up with infantry, and the same may be said of ammunition mules and those attached for medical purposes.

3. The route, destination, and duty of each column should be perfectly well known to more than one Officer in each; and should be explained to the other Officers and men at the last moment, for the work of direction must be considerably lightened if the individuals have a correct idea of the end sought.

The amount of independence allowed to columns cannot be generally defined, but the impossibility of seeing the progress of other columns, and the importance of punctuality in moving, will always render it less than in the daytime; in fact, the nature of night attacks is such that the plan for them must be very precise, and, as a rule, the action of separate parties will have to be very strictly laid down.

An exception, of course, must be made for false attacks, and also

for those made by small bodies to harass the enemy, for in these much may be attained through the enterprise of the leaders. As an example of the first may be quoted the success of Maurice de Saxe's column at Prague in 1741, though it must be confessed that it appears that he himself always intended it to be a very real attack.

The orders of the Grand Duke Michael Nicolaïwitch for the assault of Kars seem a very good model in this respect.

They were as follows:

(1.) "The troops investing Kars are to gain possession of Forts Souvari, Kanly, and Hafiz Pasha.

(2.) "The attack must be made unexpectedly, and efforts must be made to take prisoner, or else destroy, the garrisons of these forts, and to get possession of the guns in them.

(3.) "At the same time as the attack of these forts, demonstrations will be made against other points of the enemy's lines of defence, in order to divert his attention and his troops from the real point of attack.

(4.) "These demonstrations may be converted into real attacks, taking advantage of the enemy's confusion, or other favourable circumstances, but only by small bodies, in an experimental manner, in order to avoid great losses.

(5.) "Such attempts may be made also by the troops charged with the principal attack, after the latter has been executed; Fort Tchim, and the wall of the town, are specially indicated as the objects of these attempts. Under entirely exceptional circumstances, such, for example, as a case of complete panic on the part of the enemy, such an operation is authorized with reference to Karadagh, but the difficulties of its execution must not be lost sight of."

4. The hour of departure varies in particular cases and for particular columns, and must be regulated by the distance to be passed over to the starting points of the columns in the actual attack and the time at which it is desired to commence certain actions.

The latter must be decided on the following considerations:—

(1.) The distance from the previous positions of the attack only affects the question when the cover of dusk or darkness is required to conceal the preparatory concentrations; the earliest hour then possible being that which allows time to reach the desired points.

(2.) If surprise is desired, an unusual hour should be chosen.

Washington wrote: "The usual time for exploits of this kind is a little before day, for which reason a vigilant Officer is then more on the watch. I, therefore, recommend a midnight hour."

(3). If the force is small compared to that of the defence, concealment is essential, and, therefore, the hours of darkness are the best in such cases, and the same holds good in the case where the avoidance of loss is the object, for the greater the darkness the greater the inaccuracy of musketry fire. In all such cases the hour should be such that the whole combat may take place before dawn.

(4.) On the other hand, if the forces of the attack are large, they will require a certain amount of light to enable them to avoid the risks of confusion, and so moonlight hours should be chosen for their movement.

(5.) Again, if the position has to be entrenched after the capture, or failure will entail a very exposed retreat, an early hour of the night must be fixed on. This especially applies to assaults and sorties in sieges.

(6.) But, if very large forces are used which are about the same or of superior strength to those of the defence, and the object is surprise or the seizing of some point important for a line of battle, a very short time before dawn is the best hour for the commencement of the action, as recommended by Frederick the Great, Marshal Marmont, and Clausewitz.

5. Countersigns and watchwords have been of use, both in enabling different parties of the attack to recognize each other, and to denote success.

For the latter purpose one was used by the Americans at Stony Point. At the sortie from Gibraltar in 1781 the flank companies of the 39th Regiment fired on and wounded several of Hardenberg's regiment, who had got out of their proper position; but the mischief was stopped by using the countersign "Steady."

Distinctive badges are very useful, if not absolutely necessary, in night operations.

At Stony Point Washington gave directions for each man to wear one, and at the attack by the Ever Victorious Army on Soochow[1] Colonel Gordon served out white turbans to his troops.

General Brialmont[2] advocates the use of wind instruments for purposes of signalling the positions of various detachments, and commenting on the attempt on Bergen-op-Zoom, Sir John Jones says, "This is another strong instance of the good effects which might arise, where separate columns of attack are employed on the same enterprise at night, from furnishing each with its peculiar signal, either blue lights, rockets, parachutes, as a means to communicate its success or failure to the other columns." The examples of history, however, afford many instances of signals miscarrying or being misinterpreted, and mistakes have often occurred when noises and sounds have been indicated as signs for the commencement of movements, and it seems best to fix a precise time for every action, and to use a watchword to denote success to other parties in the immediate neighbourhood.

Various coloured lanterns and methods of signalling with lights have been recently tried during peace manœuvres in Russia,[3] but all such systems are complicated, which at once condemns their use in night fighting, and in addition they are very liable to alarm the defence.

Frederick the Great was very careful to call his Officers' attention to the necessity of having some means of recognizing friends from foes. In the XIIIth Article of his "Instructions" he wrote, "In night expeditions it is also necessary to make use of some mark or signal to know each other, such as the turning of the pelisses, wearing the cloaks inside out, or putting a piece of white linen on one arm, or green bough in the cap, or choosing some particular word which must be given to the people beforehand, that they may know each other in the dark; for want of this caution very serious inconvenience often happens.

Lately an entirely new means of creating distinctive badges, signals for a short distance, &c., and of assisting many operations in the dark has been invented, which may, when properly studied and experimented with, prove capable of removing many of the risks attendant on nocturnal enterprises; viz., luminous paint. It promises so well,

[1] E.V.A. [2] Brialmont. [3] Wilna.

that it deserves an exhaustive trial, and such is necessary, for it is a curious substance, whose properties are as yet little understood. One thing about it must be borne in mind, and that is, that it cannot be used on the spur of the moment, but requires considerable time for its application.

Wednesday, February 6, 1884.

LIEUTENANT-GENERAL SIR ARTHUR J. HERBERT, K.C.B., Quartermaster-General, in the Chair.

NIGHT ATTACKS.

PART II.—*Their Tactics. Infantry in the Approach, Attack, Defence. Action of Cavalry and Artillery. Conclusion.*

The Approach.

Tactics before the Assault.

THE general idea and dispositions having been explained to a sufficient number of Officers, the rest of the troops need know nothing of the enterprise until the last moment, but then everyone should be given a clear idea of his own duties, and be reminded of certain important rules.

For this purpose the forces destined for the enterprise should be massed at one or more places for the orders to be read, and, as far as necessary, explained.

At the place, or places, of assembly the various detachments will be told off, but for the sake of supervision, &c., the larger divisions of the force should be maintained intact to the latest possible moment.

The column of route formation is the easiest for the men to march in, and more manageable than any other, and in most countries will be the only possible one.

The order of march of each column depends on its composition and the circumstances, but the main bodies should always be preceded and flanked by small parties to guard against ambushes and unexpected encounters with the patrols of the defence. These detached parties should march in the formation best calculated for concealment and for giving confidence to the men, and to lessen the chances of discovery should be as near to the main body as is consistent with their object.

The different units of each column should be in some compact formation, as men easily become scattered in the dark, and are more likely to be confident and cool in close order than in the looser forma-

tions. Moreover, the smaller the space occupied the easier is concealment, and also the work of supervision of the Officers.

The intervals between units must be greater than those usually allowed in the daytime, as the columns have a greater tendency to open out, and if the intervals disappear, confusion is almost certain to follow, and the spread of it is always very rapid and wide.

The connection between the different columns and between their fractions should be carefully maintained, for if any party is ignorant of the position of its neighbours, it is extremely probable that they will take each other for the enemy, as happened at the battle of Niagara Falls[1] in 1814,

where "the detachments of the Royal Scots and 8th, forming part of the reinforcements, unfortunately mistook for the enemy the Glengarry Regiment, stationed in the woods to the right, and kept up on it a severe and destructive fire." An amusing example occurred during the attempt on Erzeroum[2] in 1877. No. 2 Column, Colonel Kruzenstern's, which had to move on Fort Akkali by the high road from the Khan, a distance of about 3 miles, managed to get off the road and wandered about the country, not knowing where it was. To improve matters, the rear battalion of the column, mistaking a herd of donkeys for Turks, began to cry out Allah! to deceive the supposed enemy; whereupon the leading battalion promptly faced about and let fly a volley at it, which luckily passed over the men's heads, but made a noise and increased the confusion.

Each column should have competent guides told off to it, who must carry out their duties in the manner dictated by circumstances, using lights and sounds to direct their parties when quite certain that there is no danger of alarming the enemy, and resorting to silent and invisible means when in close proximity. Captain Roodzinsky[3] points out that every precaution should be taken which favours concealment, and that the routes chosen by the guides should in consequence keep to low ground and shade.

In attacks on small outposts, quarters, or camps, a party should always be sent round to cut off the retreat of the defenders.

The attack by Blucher on the French post at Morsheim[4] in 1794 is an excellent example. Many enterprises conducted on this principle were successful against the French posts on the Upper Nahe[4] in 1793. Colonel Gawler[4] on his experience of Caffre warfare lays it down as a rule always to be observed in attacking a camp surrounded by woods.

The above ideas as to tactics have been expressed as rules for the sake of conciseness, but nearly all the points are open to discussion, and will be so, until these nocturnal manœuvres are practised, and some definite rules are arrived at by experience.

The want of practice will necessitate several of these tactical rules being repeated in orders whenever a night attack is undertaken, and they will have to be remembered by the men at a time when they are particularly liable to become flustered and confused. In consequence the Officers and leaders will be continually giving orders and directions during the movement, which will most likely produce noise and talking.

If the above rules are uncertain, and need only be especially brought to the notice of the troops when they have not practised

[1] James. [2] Ziekoff. [3] Roodzinsky. [4] Pierron.

them, or the circumstances lend them an extraordinary importance, the same cannot be said of those which follow, for the examples of history amply prove their correctness, while their frequent neglect and overwhelming importance make their reiteration in all orders for night attacks indispensable.

No striking of lights or smoking is to be allowed.

Signals made by trained men with proper appliances are, as already stated, objectionable, but they can be used so as to avoid the notice of the defenders; lights struck to read a watch or order by, or the glow of a pipe, cannot be concealed. The enforcement of this rule has always been difficult, and can only be effected by the closest supervision on the part of the Officers and non-commissioned officers, and by training the men never to smoke when under arms between sunset and sunrise, so as to make the observance a habit.

The silence should be as complete as possible, and be maintained until the last moment.

This rule has no exception during the approach. If any posts of the enemy lie in the line of advance, or any of his patrols are met, they must be dealt with silently.

On the 16th October, 1760, the French, thirty battalions and thirty-eight squadrons strong, lay at Kloster Kampen.[1] The Hereditary Prince, who was besieging Wesel, marched at 10 P.M. To reach the enemy's camp it was necessary to dislodge Fischer's corps of irregulars, who had occupied the convent at Kampen in their front. This action produced some firing which alarmed the whole French army. The allies failed in their enterprise.

If the patrols do not perceive the assailants, the latter had better let them pass unmolested, but if the advance is observed, every effort must be made to reach the point attacked before the alarm can spread.

A constant rider to the order concerning the maintenance of silence is one that *the rifles are not to be loaded.* The reason for this will be given directly.

As before stated, the route formation should be kept as long as possible, but when the attack has reached the proximity of the defence, it must be ready to fight at any moment, and the tactics enter another phase.

The Combat.

Tactics during the Assault.

To be ready to fight the troops must assume a fighting formation. The exact formation which is best has yet to be determined, but its main features are decided by the weapon that is to be used, and that is—the bayonet and nothing but the bayonet.

As long as the assailants are on the move, not a shot should be fired by them except under certain conditions, which are clearly defined. This is the keystone of offensive tactics by night. The shooting can have no accuracy in the dark, while it is a well-known fact that firing has a tendency to cause halting, which may lead to

[1] A.R., 1760.

recoil of the line, and it is always extremely difficult to stop when once begun.

Again, firing, while it causes the attack to slacken, gives the defence an idea of the position of the point attacked and of the strength of the assailants, and causes reinforcements to be brought up.

The strongest argument, however, against the use of firing by the attack is to be found in the numberless examples of injuries inflicted with it on each other by different columns of assailants and the consequent confusion in their ranks.

Instances of its use by the attack being of use to the defence are afforded by Kloster Kampen in 1760 already described, by an attempt to retake the town of Batavia[1] in 1811, by an affair at Orizaba,[2] Mexico, in 1862, and by an action between Russians and Turks, at a place called Berdek,[3] in 1877. At Gibraltar[4] in 1781, Stony Creek[5] 1813, and Niagara Falls[6] in 1814, our Army has received severe warnings of the dangers arising from it, while Marshal Marmont states that at Karausebes in 1789 columns of the Austrian Army under Joseph II, taking each other in the night for the enemy, fired and disabled more than 6,000 men.

All military writers have expressly stated that the attack must not fire a shot before daylight, and as a rule an injunction to that effect has formed part of the orders for all night enterprises.

It is no doubt very difficult to prevent men returning fire, especially if it is effective or takes them in flank, and therefore it seems that the order shall be not only against firing, but also that the rifles shall not be loaded. Captain Bourelly says that the soldier should be taught the disadvantage of firing, and it should be made a point of honour with him only to use his bayonet, but granting that this will do much, still accidents will happen with loaded arms, and treachery is facilitated. It is an open question whether the troops in the first line should even have their cartridges.

This point has been insisted on at some length, but its importance justifies the quoting of a few examples to support the last statements.

The following is the description of the final charge of the highly disciplined Prussians at the capture of the passage of the Iser at Podol in 1866, given in the translation of the Prussian official account. "Soon after 11 o'clock the two Fusilier Battalions of the 31st and 71st Regiments arrived at the northern entrance of Podol. The first was pushed forward to storm the bridges. General Bose and Colonel Drygalski placed themselves at its head; firing was forbidden. When the column had approached within sixty paces of the bridge, it was received by a salvo, and a flanking fire from the railway embankment, it hesitated and began to return the fire. The endeavours of the Officers soon, however, succeeded in setting the battalion in motion. General Bose himself seized a musket and marched forward with it. A regular hand-to-hand fight ensued, in which the enemy were driven back."

At the attempt on Trichinopoly[7] in 1753, 600 of the French battalion attacked Dalton's battery. "At three in the morning on the 28th of November, they passed the ditch at a place nearly dry, planted their ladders, and all entered the battery without arousing the guard of fifty Sepoys and two European gunners, who were at once despatched: but some of the enemy stumbling into a pit, their muskets went off, and gave the alarm." The attempt failed, and the assailants' retreat was cut off, for having turned the guns they had captured on the town, "the (British) artillery

[1] Thorn. [2] Bourelly. Pierron. [3] Roodzinsky.
[4] Drinkwater. [5] Brackenbridge. James. [6] James.
[7] C. of V. Orme.

Officer, guided by the frequent flashes of fire, pointed his guns so effectually as to shatter the ladders and kill a number of men."

It has been said that there are exceptions to the above hard and fast rule. They occur when the attack is a false one, forming part of a combined operation, and when the attack is made simply to harass the enemy and to deprive his troops of rest. In both these enterprises, noise, and therefore firing, are the chief means for attaining the end, but in the latter care must be taken to get as close to the hostile positions as possible before commencing, so as to gain the full effects of surprise. In the greater number of cases of both kinds, however, blank cartridge would produce just as much confusion on the side of the defence and be much less harmful to the attack; and if it were not so objectionable to increase the patterns of ammunition as to make it impossible, the experience of the battle of Niagara Falls in 1814 seems to point to the advantages of buckshot cartridges in nocturnal combats.

In connection with this battle the following remarks are given in James's "Military Occurrences":—"The great use made by the Americans of buckshot, while it swelled out the returns, occasioned most of the wounds to be very slight. That musket cartridges, in the American Service, are invariably made up with buckshot, is acknowledged by General Wilkinson; who, referring to the use of rifles in the dark, says, 'The musket and bayonet, with buckshot, is preferable, because in nocturnal affairs nothing decisive can take place but at close quarters.'"

A modification of the rule can also be made, in the attack of well-known works, for parties covering the storming columns.

Wellington's orders for the assault of Ciudad Rodrigo,[1] after detailing the various columns, run thus:—"All these columns will have detached parties especially appointed to keep up a fire on the defences during the above. The men with ladders and axes and bags must not have their arms; those who are to storm must not fire."

As the bayonet is to be the only weapon used, columns of some sort are necessary. What shall be their dimensions; what the action and position of the supports; what pace the advance shall be made at, and whether it shall be continuous or intermittent, are all questions as yet unsettled, and whose solution must, to a certain extent, depend on circumstances of time, place, and distance, and largely on the characteristics of the troops engaged.

With regard to these points the following considerations appear worthy of notice:—

The columns for the storming of breaches in fortifications require weight, and therefore must be large and deep, but, as a rule, in all other undertakings small columns will be handier, more easily kept together and concealed, and less difficult to restore to order after the assault.

The orders for experimental manœuvres in the Wilna Military District in 1881[2] lay down that the supports must be near the fighting line, as they will be of little use if not used promptly at the right moment.

The position and use of the reserve must depend entirely on the circumstances.

[1] Jones. [2] Wilna.

At the same time that darkness allows the use of columns, and the proximity of supports, it also does away with the necessity of advancing by rushes, which has been adopted in order to lessen the effects of the fire of the defence, and to secure some of the advantages of modern firearms for the attack.

Silence and secrecy must be maintained to the very last moment.

At Rugen, in 1715, the Swedes were discovered by their speaking to each other on encountering the unexpected obstacles surrounding the allies' camp. At Seringapatam, in 1792, the reinforcements of the defence consisting of a corps of Europeans, might have surprised the British right division, while still in confusion, after the capture of the Mosque redoubt, if they had not advanced with drums beating and considerable noise. The French, in their attempt on Fort Bard[1] in 1800, advanced from the village with drums beating the charge, and received a severe check, in which their commander paid the penalty of his stupidity with his life.

In fact, all the precautions that have to be taken during the approach increase in importance until the assailants are actually in the enemy's position or are perceived; not a shot should be fired, not a sound made. But once concealment is no longer possible and the issue for the time, at least, depends on hard knocks, every means should be employed to encourage the attackers, and every effort made to crush the resistance with sharp decisive blows.

After the hand-to-hand struggle or the unopposed occupation of the defensive position the tactics again enter a fresh phase.

Tactics after the Assault.

The most pressing duty is to reform the troops broken by the struggle, while fresh bodies are brought up to cover the retreat or secure the position.

When order has to a certain extent been restored, if the result has been favourable attempts may be made to increase its effects by pushing onward, but the enterprise must be undertaken tentatively at first with small bodies.

The best method of reforming the broken troops is not yet settled, but it would appear a matter eminently suited for experiments in peace-time, and one that a little practice would render much less difficult of execution.

Very often the assailants have immediately to act on the defensive, and all the rules for the defence come into play, and the same holds good when, during the actual combat, it becomes necessary to repulse a counter-attack. This will be dealt with more fully under the head of "Defence."

If the position captured is to be retained, it should immediately be placed in a state of defence.

The failure of the Turks to retain Mount St. Nicholas in the Schipka Pass and their success at Kizil-Tepe (both in 1877) are notable examples of the neglect and observance of this precaution.

An attempt to recover what they have lost is nearly sure to be made by the defenders as soon as they have have got over their first

[1] Marmont.

confusion, and so if it is not intended to retain the position, or the force proves too weak to do so, a timely retreat is advisable.

Prince Eugene, at Cremona, may be said to have lingered too long, for although he carried off Marshal Villeroi as prisoner, he lost nearly all his infantry who had entered the town. Lieutenant-Colonel Harvey's withdrawal from the scene of the action at Stony Creek in 1813, and that of the Danish raiders from Assendrup[1] in 1864, are examples of proper prudence.

It is almost needless to point out that in a descent on cantonments, &c., every measure should be taken to prevent the spread of the alarm, which might cause other parties of the defence to move to the point attacked; or that after the storming of fortresses or the seizure of a town, arrangements should be immediately made to prevent plundering.

The history of the assaults of Ciudad Rodrigo and of Badajoz, 1812, give us valuable lessons on this, while the proudest boast in the memoir of Maurice de Saxe concerning the capture of Prague[2] was that it furnished "the first instance of a town carried, in the night time, and sword in hand, by the French without being plundered."

Marshal Marmont lays down the following rules for the conduct of the surprise of strong places:—

"The fundamental principle for making a surprise successful, whether it is assisted in the place itself or not, is to promptly gain possession of an issue, which communicates with the open country. The number of troops which get in by stealth or escalade will always be very limited; it can never increase as rapidly as that of the troops which join to defend themselves, or sufficiently quickly to be formidable to a garrison formed up for the defence. The principal aim, therefore, must be to bring up powerful reinforcements as quickly as possible. When this condition is not fulfilled, if the garrison and its commandant do not lose their heads, these bold enterprises ought always to fail."

In case of failure the beaten troops are nearly sure to fall back in the direction of the last part of the advance, and consequently it would appear best to indicate rallying points on the lines of advance, even if they are somewhat roundabout. The reserve will have to cover the retreat, and had better be placed clear of the line of flight, drawn up in compact formation ready to charge the pursuers, who are pretty sure to be broken.

The words of the German writer, Lieutenant-Colonel v. Boguslawski, will form a fit end for the consideration of the tactics of the attack, summing up the subject as they do in simple language:—

"Before all, it is important to impress without a possibility of doubt on regimental Officers and men that the tactics to be used at night, especially by an assailant, are quite different to those used by day. In the latter a loose order is imperative, in the former a close order. This difference once grasped and applied, the instruction of the troops is complete. The preparation for this special duty of the leaders ought to go much farther, and I make bold to say that our infantry at the present time pays too little attention to it."

[1] Boguslawski. [2] Saxe.

The Defence.

Circumstances, and the known character of the enemy's commander, will show the defence what probability exists of a night attack, and also its probable direction and nature. It should always be remembered that the nearer the forces are together, the more likely is such an enterprise to be undertaken.

Perhaps the most effective means of preventing the other side undertaking this form of action is to make a vigorous show of intending to do so oneself, but where this is impossible every precaution must be taken to guard against the danger.

The most obvious precautions are those that remove the circumstances favourable to the attack, such as defects in the outpost system, carelessness in the look-out service, imperfections in the works of defence, and the concealment afforded by vegetation, &c. The taking of these depends mostly on the energy and intelligence of the subordinate leaders.

To assist the Officer commanding and his staff in recognizing the point attacked, a "set" map (*i.e.*, one properly adjusted to the meridian), on which lines have been drawn from the spot it is fixed at to various important places in the position, will be of very great use.

Again, knowledge of the ground, and of the disposition of the defenders, being a necessity for the assailants, steps must be taken to prevent their making reconnaissances, or receiving information. If such are successful, the chances of the attack losing its way and falling into confusion are greatly increased, and also those of being able to make an opportune counter-attack, as the plans of the enemy will not have any firm foundation.

As many landmarks should be removed as possible, for doing so will greatly increase the difficulties of approach.

Obstructions of all kinds are allies of the defence, as they must cause delay to the advance, and may oblige the columns to swerve from their appointed routes and wander into space. Their position is of much greater importance than their elaborateness, for darkness will increase the difficulties of removing or circumventing them.

The first requisite of the defence, when an attack actually takes place, is sufficient time to occupy its appointed position, and to get an idea of the assailant's aim and numbers.

It, therefore, follows that the ground in all directions should be thoroughly patrolled for a considerable distance at all hours of the night, and that the outpost system should be extended farther from the position than is usually necessary, and should include a strong inner reserve ready to oppose a hostile advance. No mere line of sentries, with picquets a little way to its rear, can ever be a sufficient protection against surprise, if the attack is properly prepared and directed with energy.

All sentries and picquets should maintain their posts as long as possible, and may be sure, if their stand is firm, that the assailant will greatly exaggerate their importance, and delay will be caused while parties are arranged to attack them.

The next object, after gaining time for the defence to form up, is to produce confusion in the ranks of the attacking columns. The picquets can do a good deal this way by retiring to a flank, as it is very likely the assailants will follow them. Later on, the inner reserve can act advantageously on the offensive by sending forward small bodies to get between the enemy's columns, or on their flanks. The columns will generally turn towards the direction from which they are assailed, and by skilful manœuvring on the part of the leaders of these small bodies, they may be caused to injure each other, or at any rate desist from the direct advance.

In the assault of Kars, three battalions of No. 1 Column advanced on Fort Tchim, by the Erzeroum road in the Kars river ravine, leaving Fort Tekmass on their left, on the top of the heights. The Turkish outposts gave the alarm, and a sortie from Tekmass took the column in flank. Turning to the left, it carried the heights, and moved on Tekmass, under a flank fire from Tchim at a range of 1,800 yards. It was heavily repulsed, and driven back to the ravine, useless for further effort.

This sending forward of small parties must take place early in the combat, or their presence in front of the line will hamper the action of the main body, unless the whole defence is to be an active offensive, as in the cases of the repulse of the French sortie from Pondicherry in 1760, and that of the Prussian attempt on the lines of Düppel on the 28th of March, 1864.

If the defenders are already drawn up awaiting the attack, the advantages of taking the latter by surprise are so great, that it will be best for the outposts to retire quietly without showing themselves, so as to lead to the belief that the advance has not been perceived, but if the troops are reposing, and time is an object, then firing is advantageous as a means of giving the alarm quickly, and the farther from the position it is begun the better, for men are very likely to lose their heads if awoke by the noise of a combat going on close to them.

In the Caffre War of 1835 two companies of the 72nd Highlanders were bivouacked near to one another. A young soldier, hearing a noise in the bush, jumped up, cried out "Caffres," and fired. The men, startled out of their sleep by the shot and thinking that they were attacked, commenced to fire on each other. Five men were mortally wounded before the Officers could stop the firing.

In the use of fire, there is one golden rule to be remembered—that independent firing always gives an indication of the strength of the firers, and that it is extremely difficult to make any estimate of the numbers firing a volley. Accordingly, even double sentries should fire together, and if one of them pretends to give the word of command, the chances are they will be taken for a picquet.

The tactics to be used by the main body of the defence depend on the answer to the question: Is it to fire or not? This answer must be—Yes, it is; unless the dispositions of the attack are thoroughly known and a purely offensive action is to be pursued.

Captain Bourelly, it is true, considers firing at night so useless and calculated to engender confusion that every effort should be made to prevent it on both sides, but even he recognizes the extreme difficulty of doing so, while all other authorities who have expressed opinions

on the subject agree in counting it one of the means of defence, and those who have not done so give a tacit assent to its use, in that they do not forbid it, as they are all careful to do in the strongest language in the case of the attack.

On appeal to history, instances of its good effect are found in the affairs of Cuddalore, Chillumbrum, Seringapatam, Bitche, and Fort Bard, in the last century; Alexandria, Brienne, Batavia, Soochow, before breech-loaders; Gitchin, Podol, Le Bourget, Villa Evrard, Danjoutin, Green Hills Plevna, Savanak,[1] Karagach, and Kars, since.

The inaccuracy of fire is doubtless extremely great, but it has two causes, viz.: the invisibility of the target, and the invisibility of the sights of the rifles. The former can be lessened by taking a position so that the attack may show out against the sky-line, or by lighting up the ground; the latter is a much more difficult problem, but not one that appears impossible of solution, and it will become less important as trajectories become flatter, though it can never be entirely done away with.

As to lighting the ground, the chief difficulty consists in the necessity that the light must proceed from the direction of the attack, or it will assist it rather than the defence. General Skobeleff, in his orders to the force which eventually captured Géok Tépé, directed large piles of wood to be lighted in the outpost line, and no fires to be burnt in the camp; which was exactly the practice of the Greeks in the fourth century before the Christian era. General Brialmont has also recommended the use of bonfires at known ranges, against which the attacking troops will show out, but in many instances the smoke would be a great disadvantage to the defence, and wood is often scarce. It is believed that as far back as 1864 the Danes made an unsuccessful effort to light the Düppel lines with electricity, and it has been suggested that electric lights could be used with balloons. The plant, however, is at present too cumbersome for any position except permanent works, and accumulators are said to leak very rapidly.

While on the subject of light, it may be well to call attention to the necessity of lighting the bottom of the walls or parapets during the defence of works, or else the immediate parties of the attack will escape notice, and the aim of their artillery will be assisted, as at the *coup-de-main* on Ghuznee in 1839.

At Brienne in 1814, and Bitche, 1793, buildings accidentally set on fire in rear of the assailants enabled their opponents to fire with effect, and this suggests one of the useful employments of artillery if buildings lie in front of the position. An example of this use of artillery on the side of the attack is afforded by the assault on Polotsk by Russians on the 19th of October, 1812.

Granting, then, that the defence is to fire, it follows that its position and formations should be such as to afford the best facilities for the effective use of the rifle, and all possible measures to lessen its acknowledged bad effects on the troops themselves should be adopted.

As to the position, its first requisite is the same as in the daytime,

[1] Roodzinsky.

a clear field of fire, though the extent of this need not be so large. As long as there is a clearing in front, woods offer certain advantages, as the attack will always experience difficulties in finding the way, which must be greater than those of the defence, and if the latter suffers defeat at one point the bad moral effect will not spread so rapidly right and left as it would in open ground.

Thus, when the Germans pierced the French line at La Tuilerie before Le Mans in 1871, the defender's troops immediately in rear could not be induced to close up to a hand-to-hand encounter, and showed the worst forms of demoralization, while others on the Ruaudin road, scarcely a mile to the north, stood firm in the woods all night, and others again, another mile further north, fought well and fiercely till the middle of next day.

Entrenchments lose much of their value, for in the dark the assailants do not fire or their fire can have no accuracy, and, as before mentioned, the absence of any fixed line that the defence is certain to hold on to is a puzzle to the attack very likely to bring it to grief.

A reduit and buildings scattered here and there are, however, always of the greatest use, as affording foothold on the ground facilitating an offensive return, when daylight renders combined movements feasible. Such elements of resistance should never be neglected.

In the daytime command over the country in front is a desirable feature in a position, but low ground is better for night combats, as the attack will show on the sky-line.

Again, in the daytime, it is necessary to deny to the enemy the possession of points commanding the position though at considerab'e distances, but unless the real battle is expected to take place after dawn, such are not important during darkness, as the hostile artillery can seldom be usefully employed.

If there is no fixed and prepared position it will be necessary to be ready for attacks coming from all directions, and some sort of laager appears advisable.

Confusion so easily arises in the dark, and surrounding objects are so indistinguishable, that all arrangements for the defence must be settled and communicated to the commanders of even the smaller units while there is yet sufficient daylight for them to learn the ground. The portion of the line allotted to each fraction should be marked in some manner, and also the route to it from the bivouac, and every commander of the larger bodies should receive instructions which will enable him to act without reference to higher authority.

General Skobeleff, in the orders before-mentioned, said: "The commander of each unit is to study the ground situated in front of his detachment; to think over the amount of assistance he can give to the neighbouring detachment in case of attack; for, I repeat, mutual support has been and will be at all times the key to victory. The ground in front must be understood; the distances measured."

Frederick the Great laid it down in his instructions to his Generals, that "on such occasions, each General should know how to act *independently*, without being obliged to wait for the instructions of the Commander-in-Chief."

The formation best suited for firing must be the line, and, as the fire of the attack is not to be feared, the only restriction to the number of men in line is that there shall be sufficient space for each to use his rifle with ease. The supports can, for the same reason,

be close up to the firing line, and their use will probably be to make counter-charges in close order, rather than to feed the front.

One point it is especially necessary to bear in mind, and that is, that the various units must face in the direction they are required to fire in, for it will be difficult, if not impossible, to make men fire obliquely to the line they defend, and if they do so it is very likely the fire will damage other parts of their own force. Hence, where flanking fire is required, great care must be taken in marking the position.

A strong reserve is always even more necessary than it is in defensive actions in the daytime, and its proportion to the whole force should be in inverse ratio to the total strength. In fact, the absence of resistance may in a few instances disarrange the plans of the attack to such an extent that, if the defence is very weak, it may be best to make but small efforts to hold the first line, and to concentrate all the force ready to make an offensive return when dawn removes the uncertainty of night. The dispositions made by General Bizanet for the defence of Bergen-op-Zoom in 1814 are an excellent model.

Sir John Jones's account gives them thus: "The defensive arrangements of General Bizanet, dictated by the peculiar nature of the defences, seemed as if planned expressly to counteract the project of the assailants, for having a very insufficient garrison (only 2,700 effective men under arms) he kept no force in any of the outworks except those covering the several gates, where he posted small guards in the retrenchments of the lunettes to watch the approach to the bridges and gates. In Fort d'Eau he shut up only sixty men, and to the redoubts of the entrenched camp allotted only twenty men to raise an alarm should any hostile body approach the unrevetted front; and by these excellent arrangements kept nearly the total of his force concentrated under his own hand. Within the fortress also he acted on a similar system of concentration, for having established a few small posts in sheltered bivouacs on the ramparts ready to move in an instant on any point attacked, he directed the remainder of the garrison to assemble, in the event of an alarm, on the weak fronts 11, 12, 13, and in reserve on the place of arms, which, being centrically situated, with direct communications to the gates and rampart, was convenient to succour any point."

At 1 A.M., when the assailants had no less than four columns actually in the fortress, the French were enabled to take the offensive stoutly against the various parties in succession, and the result was that we suffered a most severe repulse.

The above dispositions may be instructively compared with those of the Prussian commandant of Schweidnitz in 1761. The commandant of the place had received notice of the attack; his force numbered 3,680 men. He placed 1,200 in the town, 1,000 in the four forts and on the curtains, 80 in the ditch to attempt to upset the ladders, and held 1,400 as a reserve between the outer and inner enceintes. The reserve was left without any special instructions, and was composed of various detachments, and it resulted that, when the escalade commenced, part of it re-entered the town, and the rest moved from one place to another, not knowing what to do. The Austrians captured the place after four hours' fighting.

To avoid confusion the intervals between units must be well defined, and the men should thoroughly understand that they will not be relieved, but must fight to the last.

One great aim of the commander of the defence should be to take the attack by surprise, as the effect is nearly certain to be fatal to it.

This may be effected by strategem, as in the case of the French attempt on the Fort of Cuddalore in 1748, when Major Lawrence, being aware of their intention, ostentatiously withdrew the garrison during the preceding day, but returned secretly after dark, and

received the assault with a violent and unexpected fire at close quarters.

The most effective manner of acting with this end in view is to reserve the fire until it is certain to be effective, and then to pour in volley after volley as quickly as possible. General Skobeleff's order is the following:—"By day a battle may be brought on by a gradual and intelligent application of the ground and men at disposal, but at night the circumstances may be such as to render it necessary to make a great impression at once. This is the reason why in a battle by night volleys are always to be fired."

There are two other reasons for the invariable rule that all firing shall be by volleys.

1stly. Independent firing gives an indication of numbers and of the extent of the position, and volleys do not.

2ndly. Men become less excited when firing volleys, are more easily held in hand, and in consequence the confusion is lessened.

There is one exception to the rule, however, and that is where an approach consists of a well-defined defile, and the darkness is such that it cannot be clearly seen into. Then a well-sustained steady fire sweeping its surface may be of use, as was proved at the attempt on Trichinopoly[1] in 1753.

Here a party of the attack, conducted by a deserter, entered the passage leading to the gate in order to blow it in with petards. Luckily, Lieutenant Harrison, commanding, had stationed a platoon upon the rampart directly above the gate, with orders to keep up a constant fire upon the passage below, whether they saw anything or not. "Nothing could be more sensible or fortunate than his precaution, for the platoon killed, without seeing them, the man who was to apply the first petard, as well as the deserter who conducted him, and both of them fell within ten yards of the gate."

To assist surprise and to avoid confusion, and the giving notice to the assailants of the extent of the position, or of the approach of reinforcements, silence is just as necessary to the defence as it is to the attack.

Just as the attack has at various phases of the combat to act on the defensive and to adopt the rules of defence, so bodies of the defence, making counter-attacks or moving up into position, or to support parts of the line, must observe the rules for the attack; they must march silently in column, and not fire a shot as long as they are on the move. If parties meet others of the enemy while they are still marching, the Officers may remember the manœuvres of the Prussian troops at Podol in 1866. "The 2nd Battalion of the 71st Regiment advanced from the west against the bridge. Its 5th Company was fired on from the nearest houses, and soon an enemy's column advanced to the attack. The battalion halted, the two leading ranks knelt down, so as to receive the enemy, advancing in close formation, with a salvo from four ranks. When the enemy's column, at 30 paces off, could be clearly seen in the bright moonlight, the fire was delivered in full effect, and an immediate attack with the bayonet made."

To sum up, it may be said of night attacks their chief characteristic

[1] Orme.

is chance, their preparation requires forethought, the attack must have silent resolution and audacity, the defence fixed plans and steadiness.

To complete the study of the subject it is necessary to notice the action of cavalry and artillery.

Cavalry.

As to cavalry, there are examples of it having been of use in the attack of places after an entrance has been effected, in securing the possession of the streets, and in carrying out some part of the police duties, and it has also had a share in the actual attacks, when they have been made in fairly open ground.

It may be of use in harassing the enemy, and on the side of the defence in producing confusion amongst the columns of the attack. It would seem, however, that the employment of cavalry as component parts of columns with infantry would generally be of very little advantage to the latter, and of great disadvantage to the cavalry itself.

Considerable bodies of Prussian dragoons made charges on Marmont's corps during the evening of the battle of Lutzen,[1] 1813, which produced great confusion for a time, but led to nothing decisive. A large force of cavalry took part in the rout of the same Marshal's corps at Athies in the following year.

On the 15th July, 1866, the 1st Prussian Cuirassiers charged two Austrian companies in square near the village of Biskupitz[2] with no useful result, but also without great loss.

At Vionville,[1] in 1870, Prussian hussars charged at the end of the battle, and, although no great effect was immediately apparent, Prince Frederick Charles has recorded his opinion that this charge put a finishing touch to the German victory.

For small harassing attacks cavalry has often been used with great success, sometimes alone, sometimes with small bodies of infantry acting separately in the fight. Field Marshal von Muffling has described how many of these enterprises were successfully executed by a small force of 100 cavalry and 60 infantry in the winter of 1793.[1] The capture of Morsheim, in 1794, which has already been alluded to, is a good instance.

The American Civil War also affords many examples of cavalry raids, among which may be mentioned one made by 2,000 Confederate horse with some guns on General Pope's headquarters at Catlett Station, N.V.,[1] in 1862, and the capture of five companies of Federal cavalry, near Port Hudson, by Colonel Logan, in 1863.

Artillery.

Artillery, if the ranges are known and the targets fixed, may be of considerable use in covering the approach of the attack or for incendiary purposes, but its destructive effect on the *personnel* will be still less material than it is in the daytime, and the profit derived will consist almost entirely in its moral effect on the spirits of its own side. If the ranges are not known, and the targets are shifting, it can be of no use, except in false attacks and demonstrations, and its addition to the columns of attack will generally be nothing but an encumbrance.

Its usefulness on the side of the defence, however, cannot be denied, and will always be very great at short ranges, and for sweeping approaches and defiles of all sorts. For this purpose machine-guns may be included; and there is no doubt that they, in common with all other guns, have one great advantage over rifles in night firing, viz.,

[1] Pierron. [2] P.O.A.

that thay can be given a known elevation with regard to the horizontal plane, or, if it has been previously ascertained, to the plane of sight, and in consequence can be fired with a fair amount of certainty at fixed points, though these cannot be seen in the nighttime.

Conclusion.

One example will show how little the elements of nocturnal fighting have changed. In the year 413 B.C. the Athenians under Demosthenes attacked the Heights of Epipolæ, which were included in the defences of Syracuse. They surprised the fort guarding the only way of ascent, the Pass of Euryalus, and at first carried all before them. Not meeting, however, with the expected resistance and pushing on into space, they lost their formations, and some fresh troops of the defenders arriving in small compact bodies were able to turn the tide of battle. In some places the heavily-armed troops of the assailants, suddenly driven back, became so crowded as to be unable to use their arms, and in others their various parties attacked each other. The confusion was increased by parties on both sides having the same war-cries, and in the end the attack failed with terrible loss.

History shows that night attacks took place in the days of spears and javelins, did not die out after the invention of gunpowder, and promise to become more frequent as science improves the weapons of destruction. If one side does not venture on their risks, the other will. Granted that the risks are very numerous, can it be denied that many, common to both sides, arise from mistakes which have their origin in the want of practice in details? Therefore, even if a nation is too cautious to adopt nocturnal fighting as a characteristic of its tactics, is it not still worth while to accustom its soldiers to manœuvring in the dark for the sake of lessening the dangers of the defence?

It may be fairly urged that, if set rules were laid down for these enterprises, the adversary would know them, and be relieved of much uncertainty; but there is an answer to this objection. The circumstances of each action will present sufficient variety in the manner of applying the rules, and the obscurity of night will always create sufficient uncertainty; while, in this game of war, as in a game of whist, it is of much greater importance to know the method of your own side than to deceive your adversaries.

Of course, if one of these bold moves fails, a hundred loud-tongued critics will cry, "We told you so!" and easily-led "public opinion" will pour bitter blame on the luckless commander. But when reason regains its sway, as it always will in time, if a fair justification can be proved, the judgment recorded should not be too severe; for "daring enterprise, when judiciously undertaken, adds so much to the force and character of an army, by the energy and confidence it inspires in its ranks, as well as by the distractions and distrust it generates amongst its opponents, and, moreover, is of such rare occurrence, that it becomes almost a national object to uphold any effort which can bear that stamp."

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The CHAIRMAN: The first part of this lecture was perhaps not open to discussion, it being merely a statement of facts; but with reference to the latter part of it I expect there will be a good deal of difference of opinion amongst the Officers present as to the modes of making attacks, and of the means of defence at night. Therefore, we shall be very happy if any gentlemen will express their opinions.

General Sir BEAUCHAMP WALKER: I think, perhaps, as Chairman of the Council of this Institution, I may be allowed to say one word to our lecturer. My absence during the reading of the lecture was not from any disinclination to listen to it, but from unavoidable causes. I have read both papers with very great attention, and consider them a most valuable addition to the records of this Institution.

Colonel L. HALE: I cordially agree with what the Chairman says about the paper being a valuable addition to this Institution, but I much fear it will not be of any further practical value to the British Service, as it deals with a matter far beyond the digestive powers of our Army. The British Army is longing for very plain food, something as ordinary as a mutton chop, and it wants to know how to cook it—for instance, how to set an outpost at night, how to relieve sentries at night, and so on—instead of that a Francatelli comes down from Adair House, and puts before us a *plat* which requires not only much material and vast preparation, but also, for dishing it up, a perfect staff of experienced *chefs*. I am afraid, therefore, that my friend Captain Johnson's very interesting recipe will be perpetuated simply, as General Walker says, in the Journal of this Institution, and will not assume any more practical character. But the question of night operations, taking a more serious view of the subject, has of course received a good deal of attention in this country, owing to what took place in Egypt some time ago. But immediately after the war of 1870 the question came forward for discussion. That was owing to the comparative safety which troops feel and experience when making an attack by night. Somehow or other, as all history tells, bullets do not find their billets in the dark. One of the most remarkable instances of that was one of those cases which Captain Johnson has quoted—the attack on Le Bourget—the night attack of the 13th January. Le Bourget had been attacked in the daylight on the 21st of the preceding December, and was defended by three battalions of the Queen Elizabeth Regiment. The French lost heavily, and that affair is one in which the particular regiment concerned and the Prussian army take great interest, and consider that they acquired great credit on that occasion. The three battalions in the village, firing in daylight, fired away 15,600 rounds of ammunition, and incurred very considerable loss—one battalion losing upwards of 250 Officers and men. On the 21st January, when the attack took place, commencing at 10 o'clock P.M., and lasting till 1 A.M., there being only one battalion in the village, the losses to the French were insignificant. The losses to the Germans were 14 wounded, and whereas in the previous day attack three battalions had fired 15,600 rounds, in this night attack the one battalion fired on its own account 12,500 rounds, inflicting hardly any loss upon the French. The firing during the night was of the wildest description, and it is recorded that some of the French shots actually fell in the retired quarters of the Germans, 5,000 paces away from the French firing line. But notwithstanding the harmlessness of the fire at night, as shown in this and other instances, the Germans apparently have not taken up the study of the subject, or practise in night operations in any systematic way. It seems that, with regard to night combat by large forces, large forces are in a far worse position in modern warfare than they were before the introduction of the breech-loader. When Marshal Marmont's corps at Laon was attacked at night, all the attacking force had to do was to get up without surprise to within a distance of 200 or 300 yards from Marmont's line, and that distance could then be rapidly traversed. If their advance was found out before they arrived at that point, the fire of the defenders was harmless, and the assailants would simply have to go back; but now the fire of the defence extends to 900 or 1,000 yards; and woe will betide an attacking force whose approach is found out at that long distance from the defending line, and who have to make good their way across the intervening 1,000 yards up to the enemy's position. And this question of surprise is purely,

after all, a question of luck. It is not necessary to go back to Captain Johnson's classic goose, or to his unclassic herd of donkeys which we have heard of this afternoon. We know an intended surprise was frustrated, during the war of 1870, at the village of Mouzon after the battle of Beaumont. There a party of 3,000 French endeavoured to break through the village, and to gain the other side of the stream, and they would probably have been successful in their efforts had not it been that, on their way to the village, there was a herd of cattle, or some horses which becoming alarmed went on ahead into the village, and effectually roused the Germans in the village. At Gravelotte there was a flock of sheep grazing on the field in front of Saint Privat; and if that attack had taken place during the night, and those sheep had been there, they might have gone back in the same way and aroused the garrison. Therefore, everything in these night attacks depends upon luck, and it may be doubted whether a General would dare to risk a decisive engagement with a large force concerned, and everything depending upon luck. That does not of course apply to minor operations where failure is not of the same importance; and very possibly in future operations these night attacks will be conducted, whether according to the rules suggested by Captain Johnson I do not pretend to say. But there is one difference in the two classes into which these night operations fall, the night combats and the night marches. In the case of the night combat very little depends upon the Officers. Fighting in the dark is like fighting in a fog; the Officer cannot see or be seen; the man perhaps cannot see his Officer, and he may skulk away. Therefore, in determining the result of a combat at night, it depends mainly upon the individual pluck and go of the men far more than on the Officers. But in the case of the night march very little depends upon the men, and nearly everything upon the Officers, and mainly upon the Staff Officers. If the Staff Officers do not know how to lead troops about country, and cannot find their way about country, and meet all the incidents which may arise during a march, then, however good the men may be, that march must break down. Therefore, it is certainly somewhat extraordinary that in no army that I am aware of are the Staff educated in night marches. As many of you are aware, the untrained portion of our Army at the present time is the Staff—I mean the rank and file of the Staff—they are absolutely untrained so far as systematic training goes. The Staff Officers are prepared for the Staff at the Staff College, and after they leave that, they undergo no systematic practical training at all. On this account they are at a great disadvantage as compared with their more fortunate brethren the regimental Officers. The regimental Officer lately has been delighted and dismayed, pleased and pained, with six weeks' recreation all to himself; and I would delicately suggest whether the time is not come when the Staff might be rescued from their disadvantageous position, and that they might also be treated to a happy six weeks of field operations. Of course some care would be required in drawing up a series of instructions to last six weeks, but let us get the thin edge of the wedge in at once—it would be easily done—and let us go to Aldershot—I see the Assistant-Quartermaster-General up in the gallery—let us go to Aldershot, and begin a six weeks' training for the British Staff by initiating night marches. Now it will be perfectly easy, for I have thought some of the details out, employing only half a troop of cavalry, or perhaps a company of infantry, to turn out the whole of the Staff at Aldershot, including the Assistant-Quartermaster-General, and to train them in a night march. Let them be ordered to take their skeleton columns, and brigades, and divisions to certain points across the country; let them be ordered to be at certain points at certain times, having with them those orderlies who would be required to indicate the heads of columns and so forth. I venture to say that in that way a most instructive series of night marches might be carried out. There is this advantage in practising night operations, viz., that whereas when you ask a cavalry Officer to study how Von Schmidt leads a cavalry division, he says: "Oh, my dear fellow, don't be a fool; the British Army will never have a cavalry division in the field, and, therefore, it is no use studying it." The same cannot be said about night operations. Most unexpectedly, a few months ago, a British Army did undertake a night march, and it shows that it is extremely desirable that we should be prepared to do it. There is one point on which the Headquarter Staff will benefit by having these night operations, viz., that they will be able to ascertain

which Staff Officers are capable of finding their way about country at night; because that is a most difficult thing. At present there are very few Staff Officers who know how to take a column across country at night, and it would be an invaluable thing for the Headquarter Staff to know who were the Officers whom they could entrust to do this. There is one further suggestion, if it is considered desirable to take up the matter in earnest, which must be borne in mind. If the Aldershot or any other Staff are to have their six weeks, it must not be altogether in the pleasant days of summer. With regard to night marches, nobody minds galloping in the Long Valley on a bright June evening; to make the training for a night operation useful it should be carried on in the dark, dismal, dreary, snowy, rainy nights of December. If this suggestion were carried into effect, it would be of very great value to the Service, and I have not the slightest doubt, from my knowledge of the Staff at Aldershot, that they would prove as effective in their night operations in the Long Valley as they are in the only night operations which are now undertaken, viz., in the dances at the Club at Aldershot.

Major PRATT, R.A.: I agree cordially with the last speaker in his opinion, that night attacks in future will be more rare than they have been in the past, though not, perhaps, exactly on the same grounds. I think the two main reasons why they will be less frequent are: firstly, the power of the breech-loader as a quick-loading weapon. We all agree that in the attack the assaulting force should not, as a rule, fire, and the defending force should; therefore, obviously a quick-loading weapon gives an enormous power to the defence. Secondly, that nowadays we extend the outpost line to a distance from the main body some two or three times greater than was the custom at the beginning of the century. Colonel Hale has alluded to the different examples of night attacks in the campaign of 1870. The next campaign of 1877 was one fought between two nations, both of which had powerful weapons of offence, and at the same time practically used no outposts at all. The night attacks were singularly few. In fact, if you divide, as Colonel Hale suggested, the night attacks from the night marches, I think, out of the list of seven or eight attacks alluded to, there is really only one that you can say was an attack conducted at night, and that was the storming of Kars. The attack on Kars is somewhat curious when you come to study the details. Two nights before the actual attack took place the troops commenced their movements towards the fortress and were then withdrawn because, as it is stated, the night was not clear enough, and the actual attack took place on a bright moonlight night, with the temperature at freezing-point. The troops before attacking were formed up in skirmishers and company columns, each column being accompanied by artillery. The Turks fired upon them at 1,800 yards, and the General Officers are stated to have ridden from column to column *seeing* how each column progressed. Now obviously that attack was not conducted under the conditions which the lecturer and others have alluded to. There was no chance of the columns losing their way, and we may almost call it a *moonlight*—in contradistinction to a night—attack. In nearly all the other cases referred to, the night attacks were either an episode of a day attack or else a night march which culminated in an attack at dawn. I am sorry the lecturer has not referred to the question of night attacks in savage warfare. Of course, in dealing with savage nations we have mainly to consider a defence against the attack of hostile savages. Suppose from some fortuitous combination of circumstances that we have to send troops to the Soudan and to form camps there, and that we have some reason to dread a night attack, is there any principle laid down upon which we should act when the attack is delivered? Are there any orders as to the units which should turn out and fall in together, as to the manner in which they should fall in, and how the reserves in the camp should be posted? We have the experience of the Russians in Central Asia, of the French in Algeria, and of our own troops in many other parts of the world, and I think we might collect a series of maxims which would be of great use to Officers who are placed under difficult circumstances. As a slight contribution, to show the necessity of such instructions, I may mention a curious night attack which took place at Dewangiri, in India, in 1864, where a body of some 500 native troops under English Officers were attacked at night by some 1,500 Bhooteas. According to the account given, the first notice of the attack arose from an Officer getting out of his tent under the idea that some

cattle were loose in the camp. Then there was suddenly a great confusion. It was found that the Bhooteas had crept in between the sentries, and at a given signal had cut all the tent ropes. There were a great many firearms discharged in the air, and eventually a portion of the troops collected together at one side of the camp, and began firing volleys in the direction where the enemy was supposed to be. Here, I think, is an illustration of the difficulties of a night attack. Neither side, after the effect of the surprise had passed, could do anything till dawn, and when day broke, the Bhooteas were found to be under cover just outside the camp. Then, of course, our musketry had its effect, and they were finally driven off.[1] With regard to more civilized warfare, I remember a suggestion for a night attack which rather bears upon a remark of the lecturer. It was made at the battle of Fredericksburg in the American War, where one of the Generals in command was very anxious to make a night attack. He said that it was so difficult in such a case to distinguish one's own side, that he suggested that they should divest themselves of all their ordinary raiment before going into action. The result, I conceive, would have been somewhat even more startling than the suggestion of the lecturer as to luminous paint.

Lieutenant-Colonel COLVILE: I would certainly wish to endorse the views of the last speaker as to the advisability of giving some practical form to the suggestions and examples of night attack. There is no doubt, night attacks upon civilized troops will be much less frequent in future than they have been in the past, partly, as Major Pratt pointed out, in consequence of the introduction of the magazine rifle, which gives greater means of defence; and secondly, because the outposts are very much further extended than formerly; and also for another reason, which he did not allude to, namely, that in civilized warfare probably arrangements will be made for the introduction of the electric light, which will cast a light roundabout and discover any attempt at a night attack. But as the English Army is constantly engaged with Asiatics and savage troops, it may very likely find a necessity for making a night attack, and in such circumstances it would be advisable that some practical steps should be taken, and that some plain and simple maxims should be added to the "Field Exercise," applicable to all cases, and which could be adapted to the circumstances of the case. Every Officer reads the "Field Exercise," only some the Journal of this Institution.

Captain J. WOLFE MURRAY, R.A.: As allusion has just been made to experience in Central Asia, I should like to be permitted to make a few remarks on that point. I happened to be reading, a few days ago, Grodekoff's account of the campaign of 1880–81 in Central Asia, and there I came across a description of a night attack upon a small Russian force during the return from the reconnaissance of Geok Tépé. This force, about 800 strong, under General Skobeleff, started early in July, and succeeded in getting to Geok Tépé. He saw at that place all that he wanted to know; and when returning—I think it was on the night of the 6th or 7th July—he had halted at a place called Egan-batyr-kala. In the middle of the night, about two o'clock (they were expecting an attack by the Tekkes, knowing that these uncivilized troops were accustomed to that class of warfare), the attack came on. It was made in three columns or masses, apparently separated from one another. The most curious thing about it was, that one column actually came within 78 paces of the Russians, and—I think it speaks very highly for the discipline of the Russian troops—not a single shot was fired, although there was considerable noise, and no doubt a considerable amount of excitement. The Tekkes afterwards told the Russians that the reason that they did not press their attack was, that owing to their complete silence they were unable to find out where they were, and for that reason they retired. That, I think, points to some restriction being placed upon the defence firing by night; for some of the speakers almost assumed that it is a necessity to fire. I do not think this instance can be quoted in support of that statement; but as firing by night is evidently very uncertain, this is a clear instance and proof of the value of the retention of steadiness by the troops owing to their not having fired. It is possible, however, that this attack may have failed from other

[1] British loss 6 killed and 38 wounded; Bhootea loss estimated at 60 men.

causes. There was a good deal of confusion amongst the various columns; they had a long way to march—some ten to twelve miles; and very likely their *élan* may have become considerably diminished by the time they arrived in front of the Russians, whom, I should mention, they considerably outnumbered, as they were some 2,000 strong. However, as one of the speakers called for an example in Central Asia, I thought that having come across this one, I could not do better than mention it.

Major-General LYON FREMANTLE: One of the speakers alluded to an episode in the battle of Fredericksburg, and as I was with the Southern Army a short time after it happened, I may perhaps be allowed to correct a mistake. It is perfectly true that General Stonewall Jackson proposed to General Lee, after the defeat of the Northerners at Fredericksburg when they were lying between the Southerners and the river, that his division should strip themselves naked and attack them during the night. The advice was not taken by General Lee, but it is perfectly true that the advice was given, and I have often heard Southern Officers regret that it was not taken.

Colonel MALCOLM GREEN, C.B.: I should like to mention a small episode of the war in Persia in 1857, which I think bears upon the advantages of silence and non-firing on the part of a force suddenly attacked at night. The incident occurred during the night of 7th-8th February, 1857, when a British and native force, about 2,000 men, under Sir James Outram, was returning to Bushire, after having destroyed the magazine and entrenched camp of the Persian army at Barazjaon, some 45 miles from Bushire. This force was suddenly attacked and surrounded on the line of march at midnight of the 7th February by the Persian army amounting to 6,000 of all arms, including four guns, which immediately opened fire in the direction of the British force, and continued firing the whole night. Our regiments were quietly got into a formation which would best protect the stores and baggage; not a musket-shot was fired during the whole night, and only a single gun at intervals by way of a hint; the men were ordered to sit or lie down, and absolute silence maintained, so that most of the shots passed over or fell wide of them. At daybreak, on the position of the enemy becoming defined, the Persians were at once attacked by our cavalry and artillery, the former breaking completely through their line and destroying some 300 or 400 infantry and capturing two guns. The action was over by 10 A.M., the enemy making the best of their way to the mountains, our cavalry being too few in number to admit of pursuit, and the British force recommenced its march to Bushire, having lost in killed and wounded about seventy-two men. This comparatively small list of casualties I think I may safely ascribe to the dead silence and perfect discipline maintained in the different regiments during the night attack. I am not aware of the present titles of the regiments, but if any of the old 78th or 64th Officers are present I think they will have a vivid remembrance of the night in question.

Captain O'CALLAGHAN, late 16th Regiment: May I call attention to some night attacks which are remarkable chiefly for the extraordinary success which attended them? Two were in the Peninsular War; one at Arroyo dos Molinos, on the 28th October, 1811; and the other, also by Sir Rowland Hill's corps, at Almaraz, on the 19th in the following year. Both these may be considered night attacks, although day had dawned before the effect was fully realized. Two others which are remarkable for their complete success occurred much further back; one, that of the forcing of the French lines by Marlborough at Neer Hespen on the 18th July, 1705. On that occasion a large army passed through the French lines with a loss of only 200 killed and wounded. In 1811 Marlborough's army again crossed the French lines near Arleuse, and the surprise was so complete that there were actually no casualties. I think those latter instances are remarkable for the great numbers engaged and the complete success attending them.

Captain JOHNSON: The instances mentioned by the last speaker were cut out of my lecture because, as I stated at the beginning, I had to confine myself strictly to those fights which took place in the dark. I think the instance in 1705 took place after it was light, in a fog. In 1711 I imagine that Marlborough marched right round his enemy's flank; there was nobody to stop him. Major Pratt specially alluded to savage warfare. The instances that I have come across—such as the

attack on Sir Samuel Baker at Gondokoro in 1872—do not differ from any other night attacks in any appreciable feature at all. When the troops get to close quarters the formation is broken, and individual fighting takes place, resembling the attack of savages in masses. With regard to Major Pratt's remarks on the instances drawn from the war of 1877-78, at any rate, the attack on the Green Hills at Plevna by Skobeleff took place entirely in the dark. Certainly the concentration was made in the daytime under cover of a fog, but just at the very last hours of light. The attack at Kizil Tépé, I think, was entirely a night attack. The Russians tried to retake the position the next morning, but the first attack was begun and finished in the dark. The attack of Erzeroum was also entirely a night attack. Some of the fighting took place after it was light, but before then the enterprise had failed. In the attack on the village of Karagach the Russian advanced guard arrived in view of the Turkish columns, and the first dispositions for the attack were made before it was dark, but the actual fighting was in complete darkness. I beg to thank you for your attention.[1]

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[1] The details given by Colonel Hale of the attack on Le Bourget, taken together with his remarks on the affairs of Athies at the battle of Laon, appear to me to form a strong argument in favour of night attacks. He says that the firearms of 1814 were only effective for a short range, while those of to-day are so for at least 1,000 yards, and that, therefore, in case of discovery, the attack could quickly withdraw beyond the zone of danger, while now it would take considerable time and suffer great losses. This is certainly the case with a daylight surprise. When the attack has approached unseen to within a short distance of the defence, the losses now, if a retreat were necessary, would be severe, and continue much longer than formerly; but the statistics of Le Bourget (and those of many other affairs) prove that musketry fire at night, whether it be dark or moonlight, is only effective at very short ranges. Hence, if a retrograde movement becomes necessary, safety will soon be reached during the night, *i.e.*, the fact of operating by night reduces the conditions of the combat in this respect to the same state as obtained in 1814, and it may be said a long time previously. Major Pratt seeks to support Colonel Hale's view—that night attacks will be rarer in the future—by urging the great increase in the value of musketry fire on the defence given by the increased rapidity of loading, which will enable so many more shots to be fired during the advance. The chief advantage, however, of night attacks is that the effect of all fire is lessened, and consequently the more effective the weapons are made the more valuable is this advantage. Colonel Hale lays much stress on the danger of discovery resulting from the alarm being given by cattle, &c., disturbed by the advancing columns. There are a few, a very few, instances of failure resulting from this cause, and it is certainly a risk to be carefully guarded against when making the plans, but not one which will prevent night attacks being made. Major Pratt, again, thinks the modern extension of the outpost system will render night attacks rarer. If surprise be the object of the enterprise, it will not be undertaken unless defects are found in the enemy's look-out system, but such defects are of frequent occurrence in all armies, being caused by mistakes or carelessness, or perhaps most often by fatigue. The chief object of night attacks, however, is now the avoidance of loss, and surprise is only a means, certainly the best, to this end, but, if it cannot be secured, it must be dispensed with. The object of the lectures has not been to advocate the employment of the hours of night for all combats, for the risks incurred are far too great to be run unless it appears that there is no better way for employing the forces at command. The object has been to show that combats have often taken place in the night, and that, whether they will be more frequent in the future or not, such operations are a phase of tactics which cannot be neglected, while much may be learnt from the study of history, and a certain amount of practice in peace-time. If they are the most unlikely of all operations, it is a strong reason that they will succeed if undertaken, but a close study of the subject irresistibly leads to the conclusion that they are not unlikely, and must be guarded against. Captain Murray's instance is very interesting, but no foundation for an argument against the rule that the defence should fire. If in the daytime a small force, operating in a forest country, found itself surrounded by enemies but concealed in a thick piece of

Colonel SCHAW, R.E.: Unfortunately, owing to press of work I was not able to hear the lectures on the subject which I very much wished to have heard, but I shall have the opportunity of reading them hereafter. I have only heard the very interesting discussion to which the lectures have given rise. I should be very sorry, however, if the discussion were to close without one statement being made in favour of night attacks. I gather that the opinion of those who have spoken, with the exception of one speaker opposite, is that they rather think the introduction of breech-loaders and modern weapons is not in favour of night attacks, but rather the contrary, and that night attacks will be less frequent now than they have been in the past. Not having had the advantage of hearing the lectures I do not quite know what are the views of the lecturer himself, whether in support of or against night attacks, but I imagine that he wishes to put before us that night attacks ought to be more frequent than they have been in the past. That is the view which I hold very strongly. It appears to me that our tactics in the present day have been altered from necessity on account of the introduction of breech-loaders and long-range weapons. We cannot bring our troops up in close formation, and close with the enemy at once, but we are obliged to bring them up from a very great distance in open formation in order that we may not be destroyed by the fire from the lines against us, and then endeavour to collect our men, or those that are left of them, for the final attack. That being the case, the night attack is of course advantageous, because it enables us to bring our troops nearer to the enemy without being destroyed by his fire, and that appears to me to be a *raison d'être* for night attacks in the present day, a very strong reason in favour of them. Objections have been raised against night attacks for two reasons. First, that outposts are placed at greater distances than formerly; and, secondly, that long-range fire is too effective to permit of night attacks. As regards outposts, no doubt they are put at much greater distances now, or theoretically they are put at greater distances now than they used to be. But the attack of an outpost is not always an easy thing, and if there is any advantage to be derived from a night attack, I do not see why outposts should not also be attacked at night. Supposing they are so attacked, and that consequently some warning will be given of a general attack on the position, I think that late experience and the examples which have been cited this afternoon have shown us that the fire of small-arms at night is not very effective, and even if we are under fire in approaching a position at night our losses probably would not be very great. Thus it appears to me that the balance of advantage is certainly in favour of night attack, if you can bring your troops up in good order, to the right place, and at the right time. The very valuable suggestions we have had from Colonel Hale seem to me to point to the direction in which we should work, that we should study how to bring troops up at night, how to lead them, and how to conduct night attacks.

The CHAIRMAN: Ladies and Gentlemen, before moving a vote of thanks to our gallant lecturer I will, with your permission, make one or two remarks. There is no doubt that on some subjects instruction would be of use in training the Staff of the Army, but I do not apprehend that they are altogether that ignorant body that Colonel Hale represents them to be.

Colonel HALE: Untrained body; they are well educated.

The CHAIRMAN: The very last campaign showed that we had a Staff who, at all events, could organize a night attack and marshal it successfully. That the Staff may be improved there is no doubt, but I do not think that improvement will ever be derived from taking Officers and men out on cold, wet, stormy, muddy nights into the Long Valley, and there giving them instruction in night marches. Although I am not a theoretically educated Officer, as unfortunately in my younger days instruction was not easily attained, yet I believe that I and other Officers who from our youth have followed the hounds, and been accustomed to ride home long distances over all sorts of country, and who have shot in the forests of Canada, or the jungles of India, would be far more capable of directing

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copse, it would keep quiet and not betray its exact position; no one, however, would argue that because it did so, the defence should never fire. There are exceptions to every rule, especially in the many-sided game of war.—R. F. J.

the movements of troops on night marches or attacks than we should have been had we received our instruction by following the very disagreeable course suggested by my friend Colonel Hale; and I believe in his heart he himself would greatly prefer the ball in the Club-house to spending such a night as he has so vividly described in the Long Valley. We have only once had manœuvres on a large scale in England, and on that occasion the authorities who are supposed to do nothing for the instruction of the army organized a night march and the corps d'armée marched by night across Salisbury Plain. I do not mean every detail was well carried out, but they succeeded in moving troops across Salisbury Plain during a very dark night, and I also remember that there was much grumbling and many complaints, as the night was wet and stormy, and that people asked what that stupid Staff meant by taking the troops out on such a night. It appears to me we may teach the Officers a great deal about leading troops at night without rendering the instruction so irksome as Colonel Hale wishes us to do. An Officer who spoke said we have no manual or any instructions laid down for protecting a camp during the night. All I can say is, read the manual on "Outpost Duties." What are outposts? Bodies of men placed in such positions as will enable them to protect the main body from surprise, and give the troops time to get under arms before they are attacked. The instructions laid down will answer just as well if a force were in the Soudan, as if it were on Salisbury Plain, and if any one will follow these instructions out I do not think he will be surprised. I have placed outposts many times (in accordance with these instructions) and I have never been surprised. I agree entirely with what Colonel Schaw says, that so far from having fewer attacks by night for the future, we shall most probably have a great many more, and I take it from what Colonel Hale said himself, that the attacking force will suffer little loss. He gave us I do not remember exactly the number of thousands of rounds that were fired by the troops defending Le Bourget, and the very few men killed in the attacking force. Can there be a better argument in favour of a night attack than to show that this large number of rounds were fired with so little result?

Colonel HALE: May I interrupt you? All the attacking forces ran away.

The CHAIRMAN: You did not say that before. As they ran away it was curious that the defenders exhausted such an immense quantity of ammunition. The only night attack I was ever concerned in myself was an attack on a quarry in the Crimea, and I should have been excessively sorry to have attacked it during daylight. We made several futile attempts during daylight on several places in the Crimea, but the attack to which I alluded was successful; it was organized, carried out, and the quarries were occupied during the night, the enemy having been driven out. I think we all agree that the information we have received has been very valuable, and I would suggest to Captain Johnson that he should give us in a sort of addenda to his lecture the names of the books from which he has taken his illustrations, so that any Officers who choose to study the subject may be able to do so.[1] I am sure you will all join with me in thanking Captain Johnson for the trouble he has taken in preparing this lecture he has read to you, which is a very small portion of the work that he has compiled. He could have made it three times the length, but he knew that we could not spare the time. There is a great deal of valuable information contained in his lecture, although I do not agree exactly with the data that he lays down for the attacks, yet I think no one can read or hear it without obtaining a great deal of information and improving the military learning which we so much require.

[1] The authorities have since been given. See *ante*.—ED.

Friday, February 1, 1884.

ADMIRAL SIR F. LEOPOLD M'CLINTOCK, KT., F.R.S., in the Chair.

ON THE NECESSITY FOR THE SYSTEMATIC TRAINING OF NAVAL OFFICERS IN THE ART OF MANŒUVRING SHIPS UNDER STEAM.

By Captain C. P. FITZGERALD, R.N.

The CHAIRMAN: The paper which we have met together to hear read to-day is, I am sorry to say, very short, but I hope you will make up for it by a good lengthened discussion. It is not only a very interesting paper for naval men, but its subject is a most important one; and I think its appearance is well timed. For the good people of this country seem to think that our naval laurels of the old war, some eighty years ago, are renewable at pleasure and for ever, and that to be born an Englishman is to be born a seaman also. But we have only to look back over our naval history of those bygone times to see at once that the reason why our ships were better handled than those of our enemies was simply because our ships were constantly cruizing at sea, whilst theirs were compelled to remain inactive in harbour. Now this great advantage we no longer possess; moreover, naval warfare has so altered in its character, that the art of handling and manœuvring ships is still more important than it ever has been. Instead of sailing in line, as of old, each ship will have to act promptly, either to ram an enemy, or to avoid being rammed. I simply allude to these well-known facts, because I think they form the groundwork of the excellent paper that Captain Fitzgerald, who is too well known to require any introduction from me, will now read to us.

IT will, I presume, be generally admitted that in order to acquire proficiency in any art, considerable and systematic training is necessary, and although there are undoubtedly heaven-born geniuses who seem to scorn the ordinary routes by which excellence is attained, and jump as it were by magic to a complete mastery over their subject, yet these favoured individuals are undoubtedly rare, and the ordinary run of people cannot hope to excel, or even to attain to a fair proficiency in any art, without study and practice. Moreover, I do not see why the art of manœuvring ships under steam should be any exception to the general rule, that is to say, admitting that it is an art in itself, and I contend that it is so, and that it is a practical art, a thorough knowledge of which will be of the most vital importance in any future naval war. By a practical art, I mean that it cannot be learnt in the study, for although no doubt all its rules can be worked out by trigonometry and algebra, and illustrated by diagrams and curves drawn on paper to show where ships *ought* to

go to under certain circumstances of speed and helm, yet I maintain that the highest proficiency in mathematical science will be of no value whatever, unless united with the experience which is alone to be gained by practice.

If I am right in the above contention, it seems strange that the nation which claims to be the greatest naval nation in the world should take no systematic steps to ensure the training of those who will have to conduct her ships, in a practical art, upon which I venture to think so much will depend.

Several people, with more or less cleverness and imagination, have endeavoured to draw sketches of, and tried to convey to their readers some idea of what a future naval battle will be like.

A pamphlet entitled "The Battle of Port Saïd" is a clever instance of this kind of prophecy, but I don't think that any writer or thinker upon the subject will deny that success or disaster will in a large degree depend upon the nerve, eye, judgment, appreciation of speed, distance, size, turning power, and in short the "manœuvring ability" of the Captain, and then as soon as he is riddled with "Nordenfelt" and Gatlings it will devolve on the Commander, First Lieutenant, and so on perhaps down to the junior Lieutenant. But if these Officers have not had a systematic training in the art of manœuvring, they will have but a poor chance of handling their ships skilfully if suddenly called up out of one of the turrets to take command, and we might expect to hear something like the following orders: "Starboard," "Port," "Full speed ahead," "Full speed astern," "Stop her," "Man the pumps," "Hoist the boats out," &c.; unless, indeed, we go upon the assumption that the enemy are as inexperienced as we are; that, however, I think is a dangerous contingency to trust to, and one in short which we ought not to trust to.

The art of handling a ship to perfection may be seen when one of the Indian troop-ships is taken to her berth alongside Portsmouth Dockyard by one of the Queen's pilots, and no one who has seen this operation performed in half a gale of wind, with bands playing, people cheering, and all sorts of other distracting accompaniments, but must have admired, and (if he be a naval Officer) envied the skill of the man who performed it. But who are these men? Are they men of science, or astute mathematicians? Far from it, probably none of them know anything about the theoretical laws of mechanics, hydrostatics, dynamics, or even algebra, but they are practical men who have learnt their business, trained their eye, and strengthened their nerves by constant practice.

At this point I must beg that I may not be misunderstood as decrying the teaching, or condemning the knowledge of mathematics even in its higher branches by naval Officers; far from it, I think it is a very good thing, particularly if made a special subject for those who have a taste for it, and would be likely to excel and be able to apply their mathematics to some practical use; but to endeavour to cram a certain fixed quantity of it into all heads alike, whether they have a taste for it or not, is, I think, a mistake, and I would in no case advocate the cultivation of mathematics to such an extent as to make

it appear of more or of even equal consequence with the practical part of the profession.

In all walks of life people are apt to make light of, and not uncommonly to condemn, any sort of knowledge which they do not possess themselves; they realize the fact that they have got on without such and such knowledge, and therefore they conclude that it must be useless; and so I suppose that an Officer who has got on in the Navy without mathematics will be looked upon as the fox without a tail, who naturally concluded that tails were unfashionable and useless appendages. I trust that I may not be classed with the tailless fox, for I do not condemn mathematics; what I condemn is an undue exaltation of them, to the neglect of practical seamanship.

I beg leave to read an extract from the "Army and Navy Gazette" of September 1st, 1883, which illustrates pretty clearly and concisely the view I take of the matter:—

"Accidents such as that which befell the merchant-barque 'Nereid,' caused by the want of knowledge in seamanship of a naval Officer, bring the whole Service into contempt. We do not so much blame Lieutenant So and So for his want of judgment and incapacity at a critical moment, as we do the faulty system on which the authorities insist on educating young naval Officers; Captains dare hardly trust young Lieutenants on deck now-a-days, simply because so few young Officers are really seamen; as mathematicians, no doubt, they are all perfect, but it would be better for them and the country were they taught how to keep their ships clear of danger under every circumstance, than on an emergency be unable to clear the difficulty, while able to solve the problem in their heads, as to the resultant of the forces being brought into contact through their ignorance."

The above criticism, though somewhat severe, is in the main, I think, justifiable, and although I would by no means acquiesce in anything which partook of criticism of the action or administration of our rulers, still, I think we have allowed ourselves to drift, without the direct action of anybody, into a state of mind which might justly be described as theoretical, and daily events seem to prove that in doing so we have dangerously neglected, and put too low an estimate upon the value of the practical, which for a service like the Navy must always be of immeasurably greater consequence than the theoretical. The great tendency of thought in the present day is in the direction of theory, and of a desire to find out a scientific reason for everything that is done. It is not enough that a man is able to do a certain thing well, for if he cannot explain in scientific language *how* he does it, he is told contemptuously that he is only working by rule of thumb. Take, for instance, the practice and theory of navigation, and nautical astronomy; it is, no doubt, an excellent mental exercise for Officers to be able to work out the problems in spherical trigonometry, which prove the mathematical basis upon which practical navigation is constructed, but I maintain that it is not *essential* that they should be able to do so, and if in the learning of the theoretical, they are taught indirectly to undervalue, or caused through want of time and oppor-

tunity to neglect, the practical, then I say that it would be better to have less of the theoretical part made compulsory; for it is of more consequence to the country that Her Majesty's ships should be navigated in safety in all parts of the world, than that the navigating Officers should be expert mathematical theorists.

It is with a view, if possible, of checking this overwhelming tide of theory which appears to be carrying everything before it, that I propose a scheme for teaching all our young Officers the practical art of manœuvring ships under steam, as it will be under steam and not under sail that future naval battles will be fought.

The scheme which I propose, therefore, is that a certain number of old and obsolete gunboats should be fitted up somewhat after the manner of the duellists at the German universities, that is to say, they should be padded all over with some soft and elastic material, and strengthened with a few additional stringers and braces, particularly in the region of the engine-room and boilers, so as to render them safe from the effect of all ordinary collisions with vessels of their own size. The pressure on the boilers should be reduced, so that a speed of 4 or 5 knots could not be exceeded, and the rudders should be fitted with chocks to prevent them from being "put over" more than a few degrees; and any other steps taken that might suggest themselves for making the gunboats *unhandy*, and making them resemble, as nearly as possible, the movements of modern ironclads.

These gunboats should be kept at either Portsmouth or Plymouth, probably Plymouth Sound would be the most convenient place to exercise them, and at that place a regular school of manœuvring under steam should be established, and all Officers encouraged to study, and to practise at. With regard to Sub-Lieutenants it should be made a compulsory part of their training, and every Sub-Lieutenant, after he had passed through the theoretical part of his studies, should then go through a course of practical manœavring under steam, including the art of ramming, and of avoiding the ram, and of performing all kinds of intricate and complicated figures in steam tactics, which, although they might not, and in all probability would not, be required in actual warfare, would still be an admirable school for training the eye, educating the judgment, and giving confidence to those who conducted the little vessels, and, in short, fostering qualities and acquiring knowledge which would be of vital importance in actual war, and would give the possessor of them a very decided advantage over an enemy who did not possess them.

The time which the Sub-Lieutenants should be required to study at this practical school should depend upon how long they took to learn the art of handling a vessel under steam with perfect ease, and without hesitation, under all circumstances, and every Sub-Lieutenant should be required to take out a certificate of proficiency. Any Officer who failed to do so, from want of nerve, want of judgment, or who proved himself to be inapt and never likely to become expert at the art, should be required to transfer his talents to some other business, for he would not only be unfit to command a ship, but would be unfit also to take charge of a watch at sea, and could certainly be

far better spared out of the Service than an Officer who fails to come up to the required standard in mathematics, and who is now sent about his business, although he may possess in all other respects the makings of a good Officer.

It will very likely be objected that a Sub-Lieutenant has already too many examinations to pass, that his brains are already crammed with such a diversity of subjects—seamanship, gunnery, torpedoes, mathematics, physics, &c.—that his mind is in a complete muddle; that the subjects are crammed in so fast that he remembers very little of all that he learnt at the college and in the "Excellent," and that to add another subject to this long list would be the last straw to break the camel's back, that it would send the young man mad, and qualify him for Bedlam instead of for Her Majesty's Service. My reply to this is, "Then drop some of the mathematics; give up the less important for the more important." Surely this is good argument, and if you can only cram so much oats into a bag, let it be good oats and not chaff, for it really seems very much like chaff to teach people elaborate theories of dynamics and the resultant of forces, and formulas for finding out how much water will flow through a certain sized hole, and not to teach them the practical art of putting those forces into play, and of making the hole or avoiding it, as the case may be.

Further, I do not think that the training which I propose would be (in popular language) "a piling on of the agony," or would have at all the brain-fuddling effect of a severe course of mathematics; on the contrary, as it would all take place in the open air, it ought to have a restorative effect upon overworked brains; and as it would come immediately after the college course of mathematics, it would afford an excellent opportunity of putting into practice before they had time to forget them the theories which they had learnt at college; for it should not be lost sight of that the scientific training of our Officers is a means to an end, and that end I assume to be the skilful management of Her Majesty's ships in peace and war, but more particularly in war.

The only training in the art of handling a vessel under steam which our Officers now get is the little that they pick up whilst knocking about in the steam-launches and the steam-pinnaces of their ships; but this experience, such as it is, is only gained by a limited few, for the Commander or First Lieutenant of a ship, as soon as he discovers a youngster who can handle a boat tolerably well, will keep him in the steam-pinnace and not change oftener than he can help, for he will probably have had bitter experience of a "new hand" in the shape of broken stems and rubbing strakes, and various other carpenter's defects, so that the majority of midshipmen will pass for Sub-Lieutenants, and be declared qualified to take charge of a watch in one of Her Majesty's ships, without ever having had charge of a steam-boat, and perhaps not even of a sailing-boat. Moreover, the handling of a steam-launch or pinnace, although better than nothing, is not a particularly good training for the handling of a large ship, certainly not nearly such a good training as the gunboats fitted in the manner I propose would be. Steam-launches and pinnaces are too quick and

too handy, and the steam tactics and exercises which are carried out in them are too much in miniature to be of much real use, although, as I said before, they are better than nothing; but then I maintain that we ought not to be satisfied with a system of training of which it can only be said that it is better than nothing; we ought, I think, to have the best, and nothing but the best.

I am aware that I shall be met by the terrible word *expense*, and told that the country will not increase the vote for the Navy, and that to take money from the already starved ship-building vote would not be listened to for a moment by the authorities. My reply is, that, in the event of war, it would be better to have twenty-six ironclads skilfully handled than to have twenty-seven clumsily handled, or even doubtfully handled, and that, therefore, it would be good economy to expend the cost of an ironclad in preparing a proper school wherein to teach our Officers the art of handling a ship under steam. I am not prepared with the details of the exact cost of fitting six or seven gunboats in the manner which I propose, but I have no reason to suppose that it would come to more than half the cost of an ironclad, and the working expenses, when once it was started, would not be large; at any rate, if we could once get people to see that, under the altered conditions of our Navy, there is a real want for such a practical training school, I have no doubt that the money would be forthcoming from somewhere. A famous piece of retrenchment was effected not many years ago by a late Administration in the reduction of the allowance of catsmeat in the Royal Dockyards, which I have always understood was attended with the best results, for it gave a double return, or cut both ways, so to speak; as in the first place, a certain amount of money was saved, and, in the second place, the cats from not being over-fed caught more mice.

Now it is not for me to suggest retrenchment in any department of Her Majesty's Service for the purpose of raising money for my scheme, that must be left to financiers who understand these matters; but I think that the wise *principle* exhibited in the above-mentioned piece of retrenchment might be applied with excellent effect to the case of the Sub-Lieutenants, and that if they were stuffed with a little less catsmeat in the shape of high mathematics, they would probably develop a healthy appetite for more practical knowledge; and the plan which I propose would, I think, go a long way towards supplying the food.

Another objection to my project which I expect to hear raised will be somewhat in the following terms:—"In the old days of real sailing seamanship the Officers had no regular school of instruction, and no special ships set apart for teaching them their duty in; they picked it up, naturally, like Sam Weller did his education; they saw the different manœuvres performed, and they learnt their seamanship at sea in a really practical school, and see what splendid seamen the system produced. Why cannot the same plan be carried out with the same results in the present days of steam seamanship?"

My reply is, that the old seamanship was a public performance, and that the new seamanship, or the handling of a ship under steam,

is a private performance; that is to say, that in the old days when a ship came into harbour and had to beat up to her anchorage, shorten and furl sails, and pick up her berth, all the orders pertaining to the operation were given in a sufficiently loud voice for every one in the ship to hear them; all the Officers and men were on deck, and they saw the yards braced about, the maintopsail backed and filled, sail shortened and set, and all the various details performed, and they could see and judge for themselves the success or otherwise of these details; and hence every Officer who had any taste for it, and did not actually hate the smell of tar, naturally became a good practical seaman, and when it came to his turn, he was enabled to work his ship in a seamanlike manner. But under the present system that is all altered.

A ship steams slowly into harbour—perhaps "the hands" are on deck and perhaps they are not—but even if they are, the orders "starboard" and "port" are given either in a low tone of voice or else by a sign of the hand; the orders for speed are given by a mechanical telegraph to the engine-room, and in all probability the only voice heard is that of the Commander, calling a man down from aloft, or finding fault with some minor detail in the purely ornamental masts and yards, the neglect of which detracts from the smart appearance of the ship. Hence the Officers who are not actually on the bridge know nothing of what is going on; the ship comes into harbour quietly, picks up her berth, lets go her anchor, and there is an end of it; they see and hear nothing of what is done, and so when it comes to their turn to do it they cannot be expected to know much about it. Nothing looks more easy than to take a large steamship either in or out of harbour, to make a running moor, pick up a buoy, or even to put her alongside a wharf, and when it is done successfully a looker-on can see no difficulty in it; but, in reality, it requires great skill and judgment, particularly when there is a tide or strong wind blowing; it requires the person in charge to be an excellent judge of speed, distance, momentum, and turning power; and it is because these qualities can only be acquired by great practice that I propose a systematic school for teaching them in. I am quite aware that the turning powers, momentum, &c., of the gunboats, fitted as suggested, would be different from those of ironclads, but as we cannot afford to be constantly putting our valuable ironclads in imminent risk of collision—without which risk I do not think the intricacies of the art can be learnt—it is better to practise with dummies, in which I think that much useful practice could be carried out, and valuable knowledge gained.

In the days when duelling with small swords was common, all gentlemen learnt the art of fencing with blunt foils; and although it is probable that in some cases an expert fencer may have failed when it came to the real business, from a faint heart, want of nerve, or a bad cause, still, I presume that it will not be denied that a knowledge of fencing gave him confidence, and a decided advantage over an adversary who had no knowledge of the art; unless, indeed, like O'Brien and the Frenchman in "Peter Simple," the unpractised

combatant was so exceedingly clumsy and awkward as to upset his adversary's calculations, and to overcome him by the sheer force of his clumsiness and the disregard of all rules. I think that this, however, as a general principle, and applied to our Navy, would be a dangerous one to trust to; and it is because I think that a systematic training in the art, call it what you please, "fencing with ships," or any name you like, is of the very greatest importance, that I now have the honour of reading this paper before you, and of inviting discussion upon it.

It is not possible in a paper of this kind, neither is it necessary, to enter into all the details of fitting the gunboats; much, no doubt, would have to be left to practical shipwrights, and men who possess a technical knowledge of the strength of various materials, and much would probably be learnt from experience, so that we could not expect to have them perfect at once; but if the principle be once taken up and acknowledged as a wise one, there can be no mechanical difficulty in working out and perfecting the details. One fitting which naturally suggests itself would be powerful spring buffers in the bows to lessen the force of a collision; but there can be no doubt that our constructors and foremen shipwrights will prove themselves equal to the occasion if called upon to make the necessary fittings.

I may here observe that the idea of fitting and using gunboats in the manner I propose is not a new one, nor can I in any sense claim originality for it, as it has already been worked by the Russians, though not, I imagine, on the same scale, or in the same systematic manner in which I would propose to work it; but even if it had been, I do not think that we need feel ashamed of copying them, or any of our neighbours, in anything that we see good and likely to be useful to ourselves. It may not, of course, be always wise to copy wholesale and indiscriminately from a foreign Power, as some people think that we have done with our Army, without taking into consideration national differences and requirements; but I do not think that that argument would apply to the present case, and I only mention it in case someone else might take the wind out of my sails, and start objections to copying.

This is not the place, nor is it the province of a naval Officer to discuss political subjects, or to criticize the expenditure of public money; but if it is the wisdom of our rulers, and the policy of this self-governed country, with its extended colonial empire, and the enormous wealth of its defenceless Commercial Navy, to keep its War Navy scarcely equal, even in nominal strength, to that of a restless and ambitious neighbour, with few Colonies to defend, and a comparatively small commerce to protect—then, I say, if this is the policy of our country, which we cannot fail to see, though we are not justified in criticizing, it becomes more than ever the duty of us naval Officers to leave no training neglected, no strategy untried, and no ideas undeveloped, be they original or borrowed, which can in any way add to the efficiency of our Service, and thus enable us, when the day of trial comes, to defend successfully the wealth and honour of our country.

Admiral Boys: I feel some diffidence, Sir, in opening this discussion, but as you have looked towards me, I will commence by saying I feel extremely obliged to Captain Fitzgerald for bringing this subject forward, but I have one observation to make with regard to the lecture, namely, that it has been cut rather too short. I think if he had gone a little more into detail, we should have been still more obliged to him. Captain Fitzgerald first brings before us a very noticeable subject, that is, the manœuvring and bringing into harbour by the Queen's pilots of our large vessels, and the accuracy with which they are taken alongside a wharf or to a buoy, as an example of what naval Officers should be able to do, and in fact are expected to do. The pilots deserve very great credit, and, indeed, they are very first-class men, but, of course, they know every inch of their road, they know the depth of water to an inch, they have to go to a fixed point, and they know, from experience, the way to put the helm at every moment of their progress. With the naval Officer this is not so: in handling his ship at sea, in time of war, he has other elements to deal with. In the first place, the pilot in going into Portsmouth or Plymouth harbour is always in smooth water, and in the second place there is no other ship to oppose or to outmanœuvre him. The question of ramming which Sir Leopold M'Clintock has alluded to is a most important one, and the Officers of the Navy will have to consider that there is another ship trying to ram them, and it is a question of only a few seconds and a few yards whether the rammer becomes the rammee. That is most important, and should constitute another argument to induce the authorities to go more into the question of systematic training of naval Officers for manœuvring ships under steam. Now let us glance for a minute at the course that young Officers pursue in the present day. We know that when a boy gets a nomination for the Navy, he is at the age of 12½ or 13, and in order to enter the Navy he has to undergo a *competitive* examination. In my opinion that is a mistake from the very beginning, for what reference can a competitive examination at that early age bear to the capabilities of our future Captains and Officers who will have to manœuvre our ships in time of war? Well, the boys pass a successful examination, and they go to the "Britannia" for a couple of years. There they are taught no end of subjects, but really the only one that I can make out that they would not learn equally well at school, is the very simple one of getting in and out of a hammock. After that they get time given them for the rating of midshipman according to circumstances, and then they go into a sea-going ship at the age of 15. They may get into a good ship for the practice of seamanship, or they may get into an ironclad where they undergo a mixture of school and drill, may go away in cutters, and perhaps they do not have the opportunity of doing that. Then comes the critical time. At any period between the ages of 19 and 20, they go through an examination called an examination in seamanship, and that examination upon which so very much depends is carried on in a most anomalous way. A boy comes up for examination in seamanship before three examining Officers who probably never met together before. I do not mean to depreciate the qualifications of our Officers, but I maintain that it is a mistake that the capabilities of a young Officer who is to be awarded a certificate of the first, second, or third class, should have to be judged from the opinions of three strange Officers who have never met before, who may probably have no qualifications as examiners themselves, and who very likely differ amongst themselves as to what should be a first class and what should not; in fact, I have known an Officer who would never give a first class certificate to a midshipman, simply because he said no young man of that age could be a first class seaman, and therefore he was not entitled to a first class certificate. On the other hand, other Officers say that if a boy answers everything that is put to him he is entitled to a first class certificate. I can only compare this to what might happen at the examinations at the Universities, if whoever might be responsible for the examinations were to call in anyone who had taken a degree and was at leisure to examine at the schools; what would be the result? Our examiners for seamanship should be selected men, they would then be able to make a fair comparison in the classification of the certificates of our Sub-Lieutenants. Then when they have got the seamanship certificate they go to the Royal Naval College, and there they are put through a course of mathematics and various other subjects, which really, as a matter of fact, I think they ought to have passed earlier in their career—at

the age of 16 or 17; for I think I am right in saying that the standard of examination passed by the majority of Sub-Lieutenants at the Royal Naval College at the age of 21 or 22 is no more than would be expected from our youths at public schools at the age of 17 or 18. Then these Officers go to Portsmouth to prepare for their other examinations in gunnery, torpedoes, and pilotage. I myself in an ironclad in the Channel Fleet have had to put a young Officer to take charge of the middle watch who had never previously had charge of a watch in his life. That is a grand mistake, and it should be obviated by first putting young Officers to take charge of the watch in smaller vessels before putting them in charge of ironclads. There is only one point in which I differ from Captain Fitzgerald's proposals, and that is that he puts the training in the gunboats that he proposes to prepare for the purpose, after the navigation examination, instead of before it. My idea is, that we should not take boys into the Navy at the early age we do. I would abolish the "Britannia" altogether, and the best thing to do with her would be to pass her over to the "Vernon" for torpedo experiments. I would keep the boys at public or other schools until they are 16. I would then let them go into a regular man-of-war for three or four years, and then into a ramming ship with vessels attached to her, steam pinnaces and gunboats, and let them actually manœuvre and work these vessels, as well as the training ship herself, then the Officers who have charge of them could judge what they can do on the quarterdeck, and how they can handle their boats, and can award them their certificates according to their deserts. And after that, if more mathematics be required to qualify in navigation, let them go to the Royal Naval College; because it is possible that some would utterly fail at seamanship, and then the time that they had previously spent in mathematics would be thrown away, and would be no use in the naval service. I do not wish to depreciate in any way the young Officers of the present day; they are a very fine body of fellows, and I heard Lord Alcester himself say that in Egypt there was lots of "go" in them, and they were ready to do anything, but I think many have arrived at their present stage of efficiency in spite of their naval training, rather than as the result of it, and we should have still better results if we had more training in the line that Captain Fitzgerald has pointed out. There is one other observation I would make connected with expense. That word "expense," with regard to the Navy, makes me feel perfectly uncomfortable. I do not like it. Everything is curtailed for expense; and to look around our coasts, to see the undefended ports, to think of the numerical deficiencies of the Navy, and then to be told we cannot get more money for the Naval Estimates is to me a matter that is almost incomprehensible. At any rate, expense should never stand in the way of efficient training for naval Officers in manœuvring ships.

Lieutenant TUPPER, R.N.: Being but a very junior Lieutenant, I wish to make my apologies to Captain Fitzgerald for attempting to criticize his remarks. In the first place I consider that a great deal more might be done to improve the instruction of junior naval Officers in manœuvring ships at sea while they are actually on board sea-going ships. As a midshipman and Sub-Lieutenant I had a good deal of experience in handling boats and a schooner. However, when I first found myself Officer of the watch of an ironclad in the Channel Fleet, steaming out of Plymouth Sound, having to keep station and avoid a large number of fishing boats coming down upon me, I cannot say that I felt very confident, because I had never before had any practical experience of handling an ironclad, but I came out of it all right, and I resolved from that time that I would do what I could to give every midshipman an opportunity of handling the ships and keeping station, so that when they became Officers of the watch they might not feel want of confidence from inexperience as I had done; and so whenever I was on watch I made one of the midshipmen steer the ship, and another keep the ship in station under me, without any help from the quartermaster, and as little as possible from me, giving them in that way as much instruction as I could, and I soon found they could keep station and steer as well as I. In the Queen's Regulations and Instructions, paragraph 17, it said that "the Officer of the watch is to take pains to instruct the junior Officers and men in their various duties." I do not know exactly what that means, whether it means *only their own* duties, those of their particular rank, or other duties further on. I think it would be very beneficial if they were instructed

practically as Officers of watches, under the superintendence of the Officer of the watch, and allowed to keep the ship in station, to steer, and generally to handle her, and the Officer of the watch *ordered* to instruct the midshipmen of his watch in seamanship generally during his watch, it not being left, as at present, entirely to the option of the Officer of the watch whether he will do so or not. In this way the "mids" would be led to regard the time spent on watch as time devoted to learning practical seamanship, and it would not then be optional with them whether they kept their eyes about them when on deck or not. As regards Captain Fitzgerald's remarks as to reducing the mathematical course, I think any such proceeding would be very much to be deplored. At present the low standard for a third class for Sub-Lieutenants is quite within the grasp of every one. There have only been five or six failures in the last five years, and the men who failed would not have been a credit to the Service in any way. Those who fail, fail simply from not having worked, that is neglect of duty. They come to Greenwich for six months. The first five months they do not do more than they can possibly help, and then in the last month they take on an outside crammer and try to learn in the one month what they are supposed to learn in six, and then of course they fail. Then they have another month's cramming, and they generally succeed in passing. Of course in the present day it is necessary that all executive Officers should have a knowledge of applied mathematics and natural science in order that they may be able to understand the machines placed in their charge in modern warships, and we cannot get this knowledge of applied mathematics and natural science without a knowledge of at least elementary pure mathematics. Therefore, I think that instead of in any way reducing the standard it should be, if possible, raised, and this might be done with more systematic training of midshipmen both as regards practical seamanship and other studies at sea. Now as regards the expense, there are sixty-nine naval instructors; they get paid from 12*s.* to 22*s.* a-day, and they are also paid 3*d.* a-day for each midshipman. This represents something like 21,000*l.* a-year. I am quite sure there are more than sixty-nine executive Officers—Lieutenants—who would be both perfectly able and willing to undertake this instruction at an extra pay of, say, 3*s.* 6*d.* a-day, and I think in this way a saving of 15,000*l.* per annum might be made which would provide funds to carry out Captain Fitzgerald's plan of a school for instruction in naval manœuvring. I think there are several advantages which might be derived from having Lieutenants to instruct midshipmen in "study." I do not wish to cast any slur upon naval instructors, but I think that Lieutenants know better how to handle the midshipmen,—how to speak to them. They know what they have been themselves; they know all their habits, and would be more likely to carry influence with their instruction. These Lieutenants might be systematically trained to give lectures to the midshipmen in the various subjects in the same words as those given at the Royal Naval College, and then when the midshipmen go to College they will merely have to go through the same routine again, instead of (as is often the case at present), having to unlearn the methods taught by various instructors at sea, and learn those methods which are taught by the professors at the Royal Naval College.

Captain Long, R.N.: Sir Leopold M'Clintock, ladies, and gentlemen, I congratulate my friend, the lecturer, on being the first to bring this matter before this Institution. Any one who refers to Sir Thomas Brassey's 4th volume, section 3, will find that the proposition already has the support of, I might say, almost every naval man of weight in Europe. There is an old Scotch proverb which says "Aye be ceevil, but stick to your point like a rusty weathercock," and I must say that I think my friend has gone a little bit off the lines when he touches the question of naval education generally. I shall not refer to that subject. We are in the presence of a new weapon. Now we know that in past times, viz., in 1830, when the Gunnery School was instituted, and again in 1872 when the Torpedo School was started, that was considered quite sufficient reason to institute a most searching examination into the powers of that weapon, and also to take care that every Officer was thoroughly trained in its use. Now it is a fact that nearly every important war ship that has been built within the last ten years has a ram, and it is my opinion that the ram will govern naval tactics in almost all cases. Without

saying anything definitely as to the value of the ram, I say that in most cases it will govern naval tactics. If anyone refers to Mr. Barnaby's lecture on what he calls the "figure of efficiency of ships-of-war," he will find that that figure varies directly with the weight of armour carried, varies directly with the cube of the speed, and he will also find that it varies, according to this great authority, inversely to the length of the ship, because a long ship implies that a ship cannot turn well. If that be so, I think we cannot deny that the manœuvring of a ship must be most important. Admiral Randolph has said (I think, in his pamphlet), that there never was a time when the initiative of the Commanding Officer of a ship-of-war was so important as at present, and I think we may safely add that there never was a time when his tenure of office in action was likely to be so brief. I do not think I need go further than to lay down what I believe to be undoubtedly true. I said it four years ago, and I still believe it, that it is of primary importance to the efficiency of the Navy that every Officer of commissioned rank should be capable of taking his ship into action. There is a form with which you, Sir, are very well acquainted, entitled "Form of Inspection and Preparation for Battle of Her Majesty's Ships." In that paper there is an entry made with great care of every thing supposed to bear upon the fighting efficiency of the ship; and the inspecting Officer has to certify that every Lieutenant can drill his men in every warlike exercise. On the means taken to render him an efficient manœuvrer of his ship should the command devolve on him through the death or disabling of his superiors, the report is entirely silent. This is the more singular, because if you look at the displacement of modern war ships I think you will find that the weight of the armament varies from about one-twelfth to one-seventeenth of the total displacement; and it is only a matter of common sense that the value of her ramming powers must vary in some degree in the inverse ratio of those figures, because you may have a ship which might be very much knocked about, but yet her power as a ram might be intact. I think I have said enough to prove that there is a necessity for the careful training of Officers, and we will therefore go on to see what that training should be. I think it might be divided advantageously into two parts; and for the one part I should certainly advocate, as the lecturer has so well laid before us, the training by gunboats, both for manœuvring and also for ramming. I believe there are now seven months devoted to preparation for the examination in mathematics, between three and four months for gunnery and torpedoes, and one month is devoted to pilotage. Perhaps somebody here may be able to tell us bye and bye what that means, but I think that the training which Captain Fitzgerald advocates may be made a part of that pilotage course. If pilotage means learning by rote, I think it of little value, but if it means standing on the bridge and taking a ship in and out, there is a great deal in it; but there is another very important part of the training, and that is the manœuvring of ships-of-war in commission. And I will go on to that, because that is a point on which I have had more experience. I remember very well when Admiral Ryder brought forward his ramming diagrams in this theatre, and I have always thought, and I think Admiral Ryder said at the time, that he wished something of the kind could be adopted in our Service. When I was out in China the other day, where I have been for two years in command, very great care was taken upon this point. The Commander-in-Chief was very anxious that the crews should be exercised, and the cruizing was principally performed under sail. At the same time going in and out of harbours in close order was practised under steam; and steam tactics and exercises in the boats, in which all the Captains took part, was no doubt exceedingly valuable, but after all I think the object that we had in view might be perhaps even better attained by a squadron having fixed headquarters. For instance, in China we might take Chefoo, and having that for headquarters, you might go out for the day, exercise all day long, and then come back and drop anchor. While I was at Yokohama last winter I received an order from the Commander-in-Chief to report my opinion about Captain Colomb's plan of fighting an imaginary action with one of these steamboats. As the weather happened to be fine, I took the first opportunity of going out. I fitted up my boat as well as I could as Captain Colomb suggests, and went out. At first we only went through a certain number of pre-arranged manœuvres, and then I told the Officer in the boat to do what he liked,

and we would do what we liked. I formed a very high opinion of the exercise. I consider it an admirable one, exceedingly well adapted for training both Officers and men. The Officer who went away in the boat reported that he had rammed me, and I believe he certainly had, because he had far better manœuvring powers than I had. I do not think I could do better than advocate the practising of such manœuvres for all our ships. There is another point which I think demands most earnest attention on the part of everybody connected with the Navy. While I was in command during two years I only twice had the opportunity of manœuvring my ship at full power. I may say I never lost an opportunity whenever I was at sea of doing something of this kind, and I believe it has a very good effect, because people can see what the ship will do. On the second occasion on which I tried this experiment at full power, the bolt which holds the end of the wheel-ropes broke off. I need not tell anybody that the tension brought on the wheel-rope if you are manœuvring full power is a very different thing from the tension at a moderate speed. I have before said in this theatre that I think the practice naval Officers have, in times of peace, is no preparation for war, and I think it is a most ridiculous thing that they should not have more. I think every ship in the Navy ought to be steaming at full power once a quarter, not for the purpose of testing its engines, but for the purpose of testing the steering gear, and giving opportunity for manœuvring. I would only just revert to an article published last October by Lieutenant Besson, French Navy, in the "Revue Maritime" which gives a very able *résumé* of what may be considered the existing opinion about naval tactics. And then I might mention what was said in this theatre by Captain Bedford, because he happens to be the only naval Officer who has commanded ships in a sea-fight, who has ever spoken in this theatre, and his opinion is most strongly in favour of this practice. A naval action nowadays is to consist of a constant series of turnings; the helm is to be constantly hard over. Now that was a thing which I found most difficult to do, for when you are doing it at full power it brings a tremendous strain on the wheel-rope. It is essential, therefore, in order to test your gear and to train the eye, that we should do these things in time of peace, otherwise we shall have great disasters when we come to fighting. I believe that the training of the human eye is a most important matter. I do not know whether you may have seen the statement a few days ago that the Emperor of Germany, in visiting a needle factory, found that the workmen had acquired such skill that they could actually make an eye through a hair of a man's head. That was the result of long training, and I think we cannot do better in our own Service than to train our Officers to use their eyes and their judgment in manœuvring.

Professor LAMBERT: It seems to me that there are in Captain Fitzgerald's paper two salient points for discussion. The first is: Should young naval Officers receive more practical training? And the second is: Is the theoretical training which they receive at present practical or otherwise? On the first point, as to whether there should be more practical training, I believe that all who are in this room are more or less agreed. Certainly my impression is that the more practical exercise you give an Officer, the more his eye will be trained, and his nerves strengthened, and the more efficient he will be found in the time of action; but with regard to the other point, as to the usefulness of theory, and as to whether the quantity which young naval Officers take up now is excessive or not, there I am distinctly at issue with the writer of the paper. The scheme put forward by Captain Fitzgerald for the establishment of a course of manœuvring and ramming exercises seems to me to be well worthy of consideration; but I fancy that he will find a great difficulty in sufficiently strengthening the bows of his gunboats. A gunboat of 200 tons moving at the speed of 5 knots will have as much work accumulated in it as a 30-lb. shot with muzzle velocity, and I do not think it will be found possible to rig up anything in the shape of spring buffers on the bows which will be able to absorb as much energy as this without severe damage to the structure. I am not quite sure, also, whether the training which an Officer would get from this ramming in time of peace with small gunboats at low speeds would be very valuable after all, because it seems to me that the case will be very different when he is working a heavy ironclad at high speed and has Hotchkiss shell whizzing about his ears. Captain Fitzgerald talks about the "overwhelming tide of theory," and the "elaborate dynamical

principles" which junior Officers are bound to learn. I should like to know exactly where these elaborate principles are, and where is this "overwhelming tide of theory." If we examine the course of mathematics which a young naval Officer is forced to take up, we find that he has two years at the "Britannia;" then he has four or five years' service afloat, during which he averages certainly not more than two hours schooling a-day. He then goes to Greenwich, where he has a "six months" course of study. Surely this is not excessive. I do not think that the ordinary young naval Officer is such a tender organism that he cannot stand a strain which the average public schoolboy thrives upon. On the contrary I think naval Officers are healthier and more sturdy than the general run of British youth. I never saw a naval Officer who was physically or mentally one bit the worse for any theory he ever learned. On the whole the fault lies the other way; and many of them would be all the better, I think, for a little more mental training. It certainly does not seem to me that our compulsory course of study is excessive. I might refer to a Report of Professor Soley, published in 1880, which he presented to the United States Government as the result of an examination of the different naval systems of education in France, Germany, Italy, and England. There he distinctly says that our compulsory course of theoretical study for young naval Officers is lower than that of France and Germany. I take it that a sound mathematical instruction is absolutely necessary for the modern naval Officer. When I say that I do not mean what some people seem to think that mathematics solely consists in, viz., the mechanical manipulation of a lot of symbols. A proper mathematical course is one which explains the working of the laws of nature, and teaches the Officer student to think for himself, and to learn how to apply those laws to the solution of the mechanical difficulties which he is constantly meeting with in his profession. To decry theory seems to me to be retrograde. If we turn to engineering or to ship-building, or to electricity, the latest field for mechanical enterprise, we find the mathematician to the front everywhere. I do not mean such men as are solely mathematicians; but such as know how to apply their theory and do so. Where can we find men who have advanced electrical engineering more than Sir William Thomson or the late Dr. Siemens? Where can we find greater engineers than Rankine, Armstrong, and Rendel? These men are all mathematicians, and owe their eminence in their professions greatly to their power of applying theory to practice. I have some experience of one or two of the manufacturing firms in the Clyde, and find great interest in the study of the organization of their yards. I know one firm very well, that of Messrs. William Denny, Brothers, which is probably the largest private shipbuilding-yard and the most uniformly successful in the kingdom. This firm actually writes off occasionally to Sir William Thomson at the Glasgow University for two or three young mathematicians to be educated as naval constructors and become naval architects in their yards, and I can safely say that in their designing office and other departments there are at least a dozen men who have come into that yard chiefly because they have been mathematicians. It is found that the construction of modern ships and machinery requires high mathematical skill, and this firm, like the great engineering firm, Messrs. Denny and Co., with which it is closely allied, finds that to be commercially successful they must be scientific. The only method of promotion in their yards for the apprentices is by competitive examination, which is almost entirely in mathematics and allied subjects; the standard being about equal to that which we set before our young naval Officers. Surely if these people, whose sole desire is to come to the front as manufacturing firms, think that mathematical theories are absolutely necessary for them, they must indeed be so for the naval Officer, who has quite as complicated, quite as scientific, a profession as theirs. It seems to me that in these days, when a naval Officer has the command of a ship which is full from bow to stern and from deck to keel with the most complicated mathematical instruments, it is absurd to give him an education such as you gave in former times and nothing more. It may be objected that it is not necessary to teach the naval Officer all about this and all about that. Well, I quite agree it is not necessary to teach him *all* about it, but let him thoroughly understand the elementary principles which underlie the working of every piece of mechanism which he uses. Let him understand the principles which determine the stability and turning power of his ship and the recoil of his

guns and the propulsion of his torpedoes, also the laws which govern the working of all his electrical apparatus. These are all mathematical, and it is impossible for anybody to really understand them if he does not study them from a mathematical basis; I think all practical scientific men will agree with me in this. With regard to its being objected that it is not necessary to teach all these things to naval Officers, I think we might just as well say, "What is the good of having a highly educated engineer in the engine-room? The man who made the engine is the only man who need know all about it, and an intelligent stoker might work the engine just as well as your highly-trained engineer?" Yet you give your engineer a far higher scientific education than the naval Officer. That seems to me to be wrong, for the naval Officer has as many scientific things to manage as the engineer, and his education should be such as would not place him at a disadvantage. It seems to me that to decry theory is not only retrograde but it is very dangerous, and that moreover it is useless. The march of events is such that it will be absolutely impossible for us to go on without more and more theory from year to year. I believe that a naval Officer's education must not be shortened at all in the direction of theory, but must and will of necessity be extended in that direction. No doubt his education will take a much longer time than formerly, that is, in my opinion, inevitable, but still he must be educated in these things, and I believe than any system of training which neglects the teaching of naval Officers in the principles which underlie the working of the complicated tools they have to use would be very disastrous to the Service with which we have the honour of being connected.

Admiral Vesey Hamilton: I should like to say a few words on this important subject which has been brought before us by Captain Fitzgerald. Captain Fitzgerald has one advantage over Professor Lambert in that he knows the subject both practically and theoretically. Now I for my part would like to say this: "What is the use of all your theory unless you are practical seamen?" for I hold and maintain that the first essential of a naval Officer is to be a practical seaman. The next important point, I think, is that he should be a good linguist, and the third a good mathematician. Now, I am a very fair mathematician for a naval Officer, but a bad linguist. Now during my naval career I would willingly have given up all the mathematical knowledge that I ever possessed in order to have acquired one or two languages. I consider it far more important for a naval Officer that he should be a good linguist than a mathematician. A naval Officer in command should be a man of good common-sense and administrative ability, not a man who is supposed to know everything; because, I think, when he begins to know everything, about his engines, for instance, he will be rather too apt to go into the engine-room and try to ignore his chief engineer and make a mess of it, instead of availing himself of that Officer's knowledge. With regard to Lieutenant Tupper apologizing for speaking, I think everybody in this Institution is only too glad to hear a young Officer get up to speak to us as ably as he has done, and I hope we shall have the benefit of hearing him again. With some of his views I agree, but with others I differ. I think we may instance the necessity for careful organization, and for carrying out steam tactics thoroughly; for that should be the ultimate aim of our naval Officers in the present aspect of political affairs. We know at the present moment the Government are preparing their forces in order to carry two very important measures, the Municipality of London Bill and the Extension of the Suffrage, they are organizing their forces most carefully in every way to carry those measures, and the Opposition are equally organizing against them, that whichever side is successful will deserve it for the trouble and pains it has taken in organization. Now whatever our naval leaders may think, there is as great necessity to organize naval Officers with regard to fleet manœuvring; and to expect us to command fleets without that organizing or training is to me like expecting bricks to be made without straw. My first experience in a fleet was in 1870, after over twelve years' experience in command of a single ship. I should then have been very sorry to have had the responsibility of handling the nine vessels, but after I had had some experience in 1872, I would have unhesitatingly taken the responsibility of handling that fleet had I been in charge of it; I felt myself master of the situation solely from the training that I had received. The lecturer has alluded to the admirable way in which ships are brought into Portsmouth Harbour; but does he think that those

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guns and the propulsion of his torpedoes, also the laws which govern the working of all his electrical apparatus. These are all mathematical, and it is impossible for anybody to really understand them if he does not study them from a mathematical basis; I think all practical scientific men will agree with me in this. With regard to its being objected that it is not necessary to teach all these things to naval Officers, I think we might just as well say, "What is the good of having a highly educated engineer in the engine-room? The man who made the engine is the only man who need know all about it, and an intelligent stoker might work the engine just as well as your highly-trained engineer?" Yet you give your engineer a far higher scientific education than the naval Officer. That seems to me to be wrong, for the naval Officer has as many scientific things to manage as the engineer, and his education should be such as would not place him at a disadvantage. It seems to me that to decry theory is not only retrograde but it is very dangerous, and that moreover it is useless. The march of events is such that it will be absolutely impossible for us to go on without more and more theory from year to year. I believe that a naval Officer's education must not be shortened at all in the direction of theory, but must and will of necessity be extended in that direction. No doubt his education will take a much longer time than formerly, that is, in my opinion, inevitable, but still he must be educated in these things, and I believe than any system of training which neglects the teaching of naval Officers in the principles which underlie the working of the complicated tools they have to use would be very disastrous to the Service with which we have the honour of being connected.

Admiral VESEY HAMILTON: I should like to say a few words on this important subject which has been brought before us by Captain Fitzgerald. Captain Fitzgerald has one advantage over Professor Lambert in that he knows the subject both practically and theoretically. Now I for my part would like to say this: "What is the use of all your theory unless you are practical seamen?" for I hold and maintain that the first essential of a naval Officer is to be a practical seaman. The next important point, I think, is that he should be a good linguist, and the third a good mathematician. Now, I am a very fair mathematician for a naval Officer, but a bad linguist. Now during my naval career I would willingly have given up all the mathematical knowledge that I ever possessed in order to have acquired one or two languages. I consider it far more important for a naval Officer that he should be a good linguist than a mathematician. A naval Officer in command should be a man of good common-sense and administrative ability, not a man who is supposed to know everything; because, I think, when he begins to know everything, about his engines, for instance, he will be rather too apt to go into the engine-room and try to ignore his chief engineer and make a mess of it, instead of availing himself of that Officer's knowledge. With regard to Lieutenant Tupper apologizing for speaking, I think everybody in this Institution is only too glad to hear a young Officer get up to speak to us as ably as he has done, and I hope we shall have the benefit of hearing him again. With some of his views I agree, but with others I differ. I think we may instance the necessity for careful organization, and for carrying out steam tactics thoroughly; for that should be the ultimate aim of our naval Officers in the present aspect of political affairs. We know at the present moment the Government are preparing their forces in order to carry two very important measures, the Municipality of London Bill and the Extension of the Suffrage, they are organizing their forces most carefully in every way to carry those measures, and the Opposition are equally organizing against them, that whichever side is successful will deserve it for the trouble and pains it has taken in organization. Now whatever our naval leaders may think, there is as great necessity to organize naval Officers with regard to fleet manœuvring; and to expect us to command fleets without that organizing or training is to me like expecting bricks to be made without straw. My first experience in a fleet was in 1870, after over twelve years' experience in command of a single ship. I should then have been very sorry to have had the responsibility of handling the nine vessels, but after I had had some experience in 1872, I would have unhesitatingly taken the responsibility of handling that fleet had I been in charge of it; I felt myself master of the situation solely from the training that I had received. The lecturer has alluded to the admirable way in which ships are brought into Portsmouth Harbour; but does he think that those

pilots, who handle those ships so admirably, could handle six ships? I say they could not for want of training. One of the prettiest things I ever saw performed was Admiral Hornby getting six huge ironclads under weigh out of Plymouth Sound. He did not make the old-fashioned signal for one ship to weigh first and the remainder in succession, but he made the signal for the ships to weigh simultaneously. The commanders were not all his own Officers of the Channel Fleet, some were strangers to him, but he felt that confidence in himself that if anything was going wrong he could whip the signal up and rectify it before any accident happened; and as a matter of fact two ships were nearly coming into collision, but almost as soon as the Captains could take the necessary steps to avoid it, the signal was up at the Admiral's mast-head. Admiral Hornby was able to do that from his long experience in fleet manœuvring, and there is nothing that we do require so much experience in, as fleet sailing. With regard to the quotation from the "United Service Gazette," to which Captain Fitzgerald referred, I may say that when the present Sir George Nares made his first trip in command, he told his First Lieutenant to put the ship about. The First Lieutenant stared at him, he had never seen a ship put about in his life. Now that ought not to be the case. Then with regard to the statement made about working trigonometry and working navigation, and the necessity of being able to explain everything scientifically, I can give you a very curious instance. About the time that I was passing, I heard of a passing Officer who had been attached to Sir Thomas McClure, the Astronomer Royal, at the Cape of Good Hope for some time. He was very well up in all the higher branches of astronomy, but he almost failed in his examination because he did not work the ordinary day's work satisfactorily, and I think most naval Officers will agree with me that the days' work is more important in everyday naval life than to be able to work out an eclipse. Then take the case of the "Excellent" and "Vernon." You go though a most elaborate course of training for your seamen gunners and torpedo men, but you won't give your future Admirals the training in fleet-manœuvring by which alone they can properly develop the forces that must be placed under them. You might as well put a Colonel who has never seen anything more than an infantry regiment to command a mixed force of cavalry, artillery, and infantry, as to put a naval Officer in command of a fleet to handle all these weapons without practice, no matter how admirably he may handle his own ship. With regard to the examination of boys in seamanship for Sub-Lieutenants, I must say I agree with what has been already said to a great extent as to its being a lottery. I was on an Examining Board when an Acting Lieutenant of two years' standing passed the worst examination of any Officer that I ever gave a certificate to, and I believe he would have been rejected had it not been for his high certificates and splendid testimonials as to his having been an excellent Officer of the watch for four years. The fact was, he was a nervous man who had not the gift of description. The lecturer in his concluding remarks says that it is not the province of a naval Officer to criticize the expenditure of public money. I must say I am at variance with him on that point. I, as a half-pay naval Officer, consider myself a citizen and a member of a free community. Now it is as much the privilege of every citizen to pass remarks upon his rulers as it is to exercise the franchise, and I for one will always maintain that it is my duty to do so. Expression of opinions by half-pay naval Officers was tried to be put down by a First Lord of the Admiralty once, but he failed most signally. Why, I ask, in the name of fortune, is a naval Officer on half-pay not to give his opinion on any public matters when you have military Officers on full-pay in Parliament, who there criticize their rulers pretty considerably, but when the Session is over are good and subordinate Officers? What is more, I do not believe we give the slightest offence to our rulers by so doing. I have a better opinion of them than to think that we do. I am sure no man takes more interest in this Institution than Sir Astley Cooper Key, and no one likes better to see young men like Lieutenant Tupper come forward. I think I have nothing more to say on this subject, except that I most strongly concur with the lecturer as to the necessity of practical education being paramount over theoretical. The more theory you can cram into them, combined with the practical part, the better; but let us have practice first and theory afterwards for the minority, the majority can only hope to be practical.

Admiral Sir GEORGE ELLIOT: I am not going to detain you many minutes. I should have been very glad to have contented myself by only saying with regard to this paper that I agree with its substance entirely; but I may as well mention that I am about to read a paper on the 22nd of this month, which is very nearly connected with the subject Captain Fitzgerald has dealt with, inasmuch as my paper relates to the construction of ships for ramming, that naval Officers may be trained to be experts in ship manœuvring, but if you do not give them ships which are constructed skilfully for the purpose intended (ramming), they will find it very difficult to succeed in manœuvring so as to strike a blow against another ship. I shall, therefore, only say that my paper is printed, and that I shall have no ideas to alter in consequence of the discussion that has taken place to-day. As one of the old school, I was very anxious to hear what the young school of the present day would be likely to say with regard to this question of practical education and science. I consider that Captain Fitzgerald is perfectly entitled to call seamanship an "art." It is a far more difficult science to acquire than any mathematical problem which you can name. I believe that if you take the ordinary run of men, by continued practice and training you may teach them to be mathematicians. One man may take twice the length of time and require twice the instruction that another man will, still he may become a mathematician; but I believe there are many men who never will become sailors. It is not to be taught by cramming; in fact, it is a gift. There are geniuses in that respect as well as in other branches of science. I do not say that I would turn Officers out of the Service because they are not geniuses, but I think, if the question arose to-morrow of a war, a great deal that has been said to-night about science would be lost sight of. I want to know whom an Admiral would choose to command his ships if he was going into battle to-morrow—whether he would choose, as the Captains of those ships, the men who were known to be practical seamen or the men who had passed the very highest examination at the Naval College? That is my view of the case. I do not say that scientific acquirement is not useful for most Officers, but I say that science has been made supreme and that practical education has been greatly neglected. I would sooner teach our Officers to be practical seamen first, at any rate, and if it takes double the time, let them go on teaching them how to act as practical seamen, and in the day of battle I am perfectly certain we shall gain a large advantage from that system. Some remarks have been made with regard to naval Officers not being represented in Parliament. When I hear young Officers, who are rising up, speak so ably as they have done, on this occasion, it makes me feel much greater regret that the door is closed against naval Officers entering Parliament, particularly now that it does not require a large fortune to get into Parliament. The door has been shut against naval Officers, and I believe that I was perhaps the first instance in which the door was completely closed against a naval Officer on the active list, because when I was in Parliament I was made to accept the Chiltern Hundreds or to leave the Service; that is to say, I was offered a command, and I was told, "You must give up your seat in Parliament, or I cannot give you the command." What is the consequence? No naval Officer on the active list can go into Parliament because he would very seldom get a constituency to return him, for this reason—that if they knew that next day he may have an appointment, and then he will cease to be their member, they are not likely to select him. I think it is a great mistake that we are not represented in Parliament, and that is one of the great grievances the Service has to complain of. Military men are strongly represented in Parliament, but with us that is not the case, and I think that is a battle which we ought to fight out, and endeavour to put an end to that injustice, because until we are properly represented in Parliament I do not believe that those questions which are so ably discussed here will ever create any impression elsewhere. We have only to read the naval debates each year to see how these questions are dealt with, and how little support the Navy has to depend upon.

Captain P. COLOMB, R.N.: The lecturer's paper appears to deal with two heads, although in reading it I was not myself aware of it. The discussion has distinctly gone into two branches: one, the question of training in manœuvring; and the other, the general education of the naval Officer, and especially mathematical *versus* practical instruction. The Chairman alluded in his opening remarks to the

old seamanship, and to the fact that we were very apt to think that it would all come right as it came right in the old days, and that we should find when we came into action that we should understand what was before us, because of that inherent seamanship which is supposed to reside in the British Navy. I do not think that we can say at all in the present day that the old seamanship helps us very much. I believe modern seamanship is much more of a science than an art: its laws are much more understood and more fixed. The old seaman, it might be said, like the poet, was born and not made, and he rode his ship as he rode a horse. He did not quite know how he did it; he could not explain how he did it; he could not have told us what the process was by which he manœuvred his ship, but his eye, his hand, and his brain all worked together, as in riding a horse or as in playing a musical instrument, and he managed his ship in that way which made the British seaman from Queen Elizabeth's time onwards *par excellence* the seaman of the world. I think much of that has passed away, and that modern manœuvring will depend more and more upon fixed rules. The laws which govern the manœuvring powers of ships are becoming more and more reduced to chapter and verse, and that chapter and verse will govern to a very great extent the manœuvring of modern ships. You will not only have the seaman who manœuvres because his instincts tell him what is to be done, but he will be able to tell you why he makes every movement and why he gives every order. Of course the manœuvring of ships is also an art. You cannot keep clear of the necessity of educating the eye. As Captain Long has said, there is no question that the education of the eye is a most important element in manœuvring your ship; but my impression is, you must in the first instance understand something of the laws by which your ship is manœuvred; and although I quite agree that you may by enormous practice get the instinct which is the result of those laws, and so get the power of manœuvring, yet I believe you would get it in a shorter time if you first understood the laws which govern the manœuvring of your ship, and then applied them in practice. I was very much struck with what Captain Long pointed out as to the way in which we neglect the teaching of the use of the ram as a weapon; how we teach the use of every other weapon we have to deal with and absolutely leave out of consideration the one weapon which most of us believe is the chief weapon of all. I think it was Captain Long who said that the ram would govern tactics. Of course that will be disputed; some will tell you the gun will govern them, and others that the torpedo will govern them; but, at any rate, there will be a very large section who will tell you that the ram will govern them, and that opinion is numerously backed up by the fact that all the heavy ships are being made rams. There is no question that most naval Officers have it in their minds that, if the time should unhappily come when they would have to defend the wealth and honour of the country, there is a sort of natural instinct that they will have to make for the enemy with the ram, as was done, in fact, in the encounter between the "Bouvet" and the "Meteor" in the West Indies. In this action the French Commander almost immediately understood what that meant, and had for the time a great advantage over the German ship by making the ramming attack. The fact being, then, that the ram is at any rate admitted a very important weapon, we shall, no doubt, in future years look back upon this time as a very curious, misty period of naval education; to think that we should have left out of sight training in the use of this weapon, which we have put into every large ship at a very great expense, and which we admit we should use; but that we should at the same time altogether drop any idea of any training as to how we propose to use it. The lecturer in his paper, and several other speakers in the remarks that followed it, have referred to the extraordinary skill of the Queen's pilots, especially in Portsmouth Harbour. I have seen a great deal of this work recently and I cannot help bearing testimony to the astonishing calmness, nerve, and capacity of the pilots in dealing with these enormous ships that they bring in and out of the harbour so readily. I have sometimes felt inclined to put my hand on the pilot's arm, and say, "You are making too close a shave!" but I have always withheld myself, because I have felt such confidence in the man. There is no doubt whatever that their capacity in managing these ships, and what they can do with them from long experience, is most extraordinary. But, as has been remarked by Admiral Hamilton and Sir George Elliot,

that is a totally different thing to the kind of manœuvring to which Captain Fitzgerald would have us trained, namely, manœuvring at speed. Manœuvring at speed is a totally different thing from coming up to a wharf or a buoy, or anything of that sort. When you bring a ship up to a buoy or a wharf at a slow speed you can watch the tendency of the ship one way or the other, and you can check it in time. It is a mere question of practice. You do not want anything more than to keep an exceedingly sharp look-out on the motion of the ship, and when it is going the wrong way to check it and put it in the right way. But the difference of manœuvring at speed is this, that we are dealing with an enormous momentum, with fixed laws, and that there is no time to correct a wrong movement. If you once make your wrong movement, there will be, too often, no possibility of correcting it; therefore, I think the first step in adopting Captain Fitzgerald's plan is to get a thorough knowledge of the laws which govern the manœuvring powers of ships at speed. That cannot be done in a day. The plan that he suggests must go on growing and growing continually, side by side with accurate experiment, until we do get a perfect knowledge of those laws. I will only just advert to one law which now seems to me to be established, and I venture to say there is not a naval Officer in this room who is aware of it. A great many ships have been accurately measured in their manœuvring powers, and not one has been found capable of turning more than one point from her old course in the process of turning four points as far as the direction of the ship's head is concerned. That is to say, the course that you pursue in turning four points is only one point different from the course you would have pursued had you continued on your old course. That is now, I think, an established condition of manœuvring at speed. And so, by experiments made to ascertain the manœuvring powers of ships (which are becoming more and more accurate as time goes on) we find that there are certain very fixed laws about them, certain laws which seem to govern every ship in every turn, whatever you do with her. Another law which appears to be universal is, that in turning eight points the second four points is always shorter, and generally very much shorter, than the first four points, and almost invariably shorter than any other four points you may turn in your circle. A quotation by the lecturer stated that few young Officers were really seamen. I do not quite agree with that. I think most of the young Officers growing up are seamen in the modern sense of the term; they are certainly not seamen such as we used to understand by the term, but I think they have a grasp of the facts connected with the new seamanship which does not justify the writer in using that particular language towards them. Coming now to the question of the gunboats, the lecturer points out that they might be made sufficiently unhandy to resemble large ships in their manœuvring powers. There is no question about that; you may at a very small expense so manipulate a gunboat, by reducing the helm-angle and by adding depth of keel under the keel, as to make her manœuvre as badly as you like. Well, that point brings me to a remark of Captain Long's which deserves observation. He said, being a long ship implies that the ship cannot turn. That is another of those ideas which experiment is beginning to dissipate. It is found now that length is only one element, like helm-angle or speed of helm movement, in the turning power of a ship, and that you cannot say that because a ship is a hundred feet shorter than another ship, therefore it will turn in proportionately smaller space or time. We have undoubtedly instances of ships 150 feet long which take as large a space and as great a time to turn in, with the same helm-angle and everything apparently the same, as a ship eight or ten times the tonnage and twice as long. I think if Captain Fitzgerald would aim at two gunboats to begin with, something might be done. There is no doubt that our minds are coming into that condition when a practical measure of this sort might be brought in; but I think we had better not ask too much at a time; and if we had two gunboats, they might be fitted to begin with, at a small expense, and then, if the results were good, we might perhaps proceed further. Captain Long alluded to my experiments in the "Thunderer," with the steam pinnace, and he also found as I had the value of them, that value consisting in the fact that nothing was settled beforehand. The experiment puts you in a very different position when you do not know what your opponent is going to do the next minute; and when it is no use your preparing for any particular action or event unless you have made up your mind

as to what you are going to do, because the particular thing might not fit the movement that he is about to make. That was the strong point which dwelt upon my mind, and all the exercises that I had previously carried out were very much lessened in value as compared with this particular exercise, which compelled me to do things which I was not prepared to do, and which I had to prepare myself to do in a very short time, without warning beforehand. The lecturer pointed out that nowadays seamanship was a private performance, and that Officers did not see as a rule what was going on on deck in manœuvring a ship. There is a certain amount of truth in that, but it is not the whole truth; because, as a matter of fact, in the old times an Officer on deck saw the masts and yards worked, he saw the head sails backed, and all that sort of thing, but he did not see what the effect on the ship was any more than he does now. I think that in that way seamanship, with regard to the effect on the ship, is learnt as well now as it was in the old days, although the process certainly is not seen. The drawings of the Russian ramming experiments are here in the Institution. They ought to be very carefully studied; I think they are admirable, as showing what may and what may not be done, and very curious as showing for how long a time ships may manœuvre with the best intentions to ram one another, and yet not succeed. A remark was made as to the advantage of training Sub-Lieutenants in pilotage; and it was said that if it was merely bookwork there was not very much in it, but if, on the other hand, they were practised in taking a ship in and out of harbour, and studying general pilotage work, there was a great advantage. At Portsmouth, although there is not as much practical work as could be wished, still there is a great deal of it, and young men do get a quantity of actual practical work in piloting boats and small vessels about Spithead, bringing them into harbour, and so on. Professor Lambert took the other side of the paper, which was the question of the use of mathematical training as opposed to practical; but I do not think that the lecturer really meant to altogether oppose mathematical training. What I think he meant to say was, that if you have to give up either the practical or the purely mathematical, you had better give up the mathematical; and I may say I rather agree with that view, although I fully agree with Professor Lambert in believing that, for the head which is capable of mathematics, a mathematical training is of the very greatest importance. But I think that the heads of half of the naval Officers are not mathematically inclined; they may learn to manipulate symbols, as Professor Lambert has said, but they do not take to it, and they do not apply the manipulations of symbols to their practical work. And sometimes it is only with very great difficulty that they get the power of manipulating these symbols at all into their heads. I would give anything myself to be a good mathematician; but if I had my choice in beginning my career as to whether I would be a mathematician or a linguist, I should certainly be obliged to say, as a practical man, "Let me be a linguist," for that is for the naval Officer by far the most important of the two trainings. I think that is all that need be said on the second part of the question, and I have dealt sufficiently with the first part.

Captain CURTIS: I will not detain you more than two or three minutes. We are greatly indebted in this Institution to Captain Colomb for calling our attention to the theory of steering ships. Now you seldom or ever hear of a double screw going away without there being something the matter with the rudder, and the ship has to return to harbour in consequence of the bad steerage. It is in consequence of the action of the water on the back of the rudder—the water is following the ship up. My father was an old naval Officer, and there was a constant cry in his time of a want of practical seamanship. Do not let it go forth from this Institution that we find fault with the young Officers—young Officers will turn out very much as they are trained by their superiors. What the rising generation want is practice, and not so much theory, although theory and practice combined are very good. Stephenson, a practical man, was a great engineer, and yet all the theoretical men opposed him in the House of Commons, saying that he could not travel at the rate which he proposed, and that his friction and so forth was not correct. After Captain Colomb gave that lecture here to which I have referred, I studied, as far as I was able, the theory of the laws governing bodies in motion in fluids. It was asked whether Captain Colomb would not favour us at some future time with the reason why a

ship turns to the right or to the left on first starting. Now, with a right-handed screw, when the inertia is not overcome in the whole mass or ship, the ship's stern turns to the right, the rudder has no power over her until the whole mass is in motion, and they have no business to get under weigh from a wharf unless they have a full strain on the spring. With regard to rams and torpedoes, I may say I think the torpedo is improving day by day, and will be of more importance than the ram.

Captain J. C. R. COLOMB, late R.M.A.: No doubt there must be a general concurrence of opinion as to the necessity of this systematic training of naval Officers. The lecturer makes a suggestion with reference to the application of gunboats and the use of gunboats for that purpose. He says, "steam-launches and pinnaces are too quick and too handy, and the steam tactics and exercises which are carried out in them are too much in miniature to be of much real use, although, as I said before, they are better than nothing; but then I maintain that we ought not to be satisfied with a system of training of which it can only be said that it is better than nothing; we ought, I think, to have the best, and nothing but the best." Does the lecturer consider that giving a short training in gunboats specially fitted to make them unwieldy and unhandy, going only 4 or 5 knots, would be the best training for naval Officers in the art of manœuvring ironclads at high speed in fleet actions at sea? I must confess it may be a small means to an end with regard to the junior Officers, and I think no practical man—be he sailor or be he not—who has been on Her Majesty's ships, can deny that any practical training in such a matter as handling a vessel under weigh is an essential of the first importance to the naval Officer; but all I want to ask is, "Have you made up your minds that what the lecturer has put before you is the best and the sole means?" It appears to me, I must say, wholly inadequate, and when you remember that it is the senior Officers who must command your ships, and that it is the senior Officers who may have the responsibility put upon their shoulders any day of having to command a fleet, I would ask, "What is going to be done with them?" Are they to continue as at present, or are they to look back to a few months' training in a gunboat going 4 knots some twenty years before?" It appears to me the question is wider, and that you can only accept it as concerning the younger Officers of the Navy, and that you must devise some system by which your senior Officers shall have more training in handling the actual ships—going at high speed—they would have to fight.

Admiral STOPFORD: May I just say a word? The lecturer has suggested that another subject should be added to a naval Officer's education, and it has also been recommended by certain gentlemen here that young Officers shall go to sea at 16 instead of 12½. Now, how you are to cram an additional subject into a shorter space of time I cannot understand. I object to anything that will have the effect of putting off the promotion of young Officers. I am one of the old school myself, but long before I was 21 I kept Officer's watch in a three-decker at sea; but now you see young Officers at the age of 40 and 41, who ought to be Rear-Admirals, commanding twopenny gunboats.

Admiral BOYS: As I think Admiral Stopford referred to a remark made by me, I may explain that when I referred to boys going to sea at 16, my idea was that they should learn their mathematics before they went instead of cramming them into the time afterwards.

Mr. LAUGHTON, M.A., R.N.: Anything I might have had to say on the subject of this paper has been very much better said by Admiral Hamilton and Captain Colomb. We all quite agree with Captain Fitzgerald's view, that if anything is to be thrown out of the curriculum mathematics ought to give way to practical training. Professor Lambert seemed to think that Captain Fitzgerald's view on that subject was radically different from his own; or perhaps from not having noticed the particular language that Captain Fitzgerald used when he said that the highest proficiency in a mathematical sense would be of no value whatever "*unless* united with the experience which is alone to be gained by practice." He does not say that mathematical training is of no use whatever. With what Admiral Boys has said as to the advantage of the mathematical training preceding the practical I entirely agree; but I have so often said so in this theatre that it is not necessary for me now to enlarge on that subject. But what I now principally wish to point out to the meeting is a very important peculiarity of naval war as it will be in the future as

distinguished from what it has been in the past. In the olden times, if by the careless handling of a fleet, individual ships got into danger, as they not infrequently did, the pluck and the individual skill of the Officers and ships' companies could very frequently bring them out of it. As a particular instance of what I mean I may refer to the battles of Sir Edward Hughes with Suffren, when, on two different occasions, the "Exeter" and the "Monmouth" got into very grievous trouble, and by the undaunted and brilliant courage of the Captain and Officers of those ships they came through. But nowadays it will not be a question of pluck or skill; the pluck and bravery and all the rest of it will be put under water almost before they have time to show themselves. The skill that will be needed is that of the Admiral and senior Officers alone, and it is that,I think, which needs most carefully to be cultivated. That, I think, is the teaching of history on this matter; as such I beg to offer it as my little contribution to this discussion.

Captain FITZGERALD, in reply: The Chairman and Admiral Boys have both objected to the shortness of my paper. There are two ways of saying a thing—one is to spin it out as long as you can, and the other is to put all you have to say into as short a space as possible. I have endeavoured to do the latter in my paper, and I hoped it would be one source of its popularity. I must remind you that if it had not been short you would not have had time for all this interesting discussion which has followed, and which is far more enlightening than my paper. The only other remark made by Admiral Boys to which it is necessary to refer is with regard to putting the practical training in the gunboats before the theoretical training. I beg leave to differ from the Admiral, for this reason—that I think the boys would hardly understand the meaning of the thing. When a midshipman goes to sea he picks up a certain idea of what a boat is, and a ship; but if you had put him through complicated manœuvres in a gunboat before he has his initiative training he would hardly understand the meaning of them. Besides, I would give him the opportunity of putting into practice all the theoretical learning which he is supposed to get at College, and which some of them *do* get and can apply. He would then be able to see whether it was of any use to him, and whether he could apply it, because if he could not apply it, it would be of no use. The effect of cramming mathematics into a boy's head, if it cannot be brought out in a practical form, cannot be any good to any one. I am very glad to see that Lieutenant Tupper has come up here to do battle for the scientific branch of the young Officers at the College. The first point he touched upon was that of putting midshipmen temporarily in charge of watches, to teach them their work. Of course that is rather beside the subject. Any Officers who took an interest in their youngsters' education would do that naturally, and they may learn something; but that is not the question of learning manœuvring absolutely. He also rejects my proposition to reduce the mathematical course. That course is the one point upon which so many of us split. Professor Lambert and others say, "You must have mathematics, and you must have the other too." Well, as Professor Laughton very kindly pointed out in the most clear manner, all I said was that the mathematics was no good *unless* combined with practice. That one word "unless," I think, answers the whole question of my objecting to mathematics. I only object to their being put in the position of superiority to practical training, and to the fact that the certificate which the Sub-Lieutenant gets at College is considered of more value, and puts him over the head of more of his fellow-creatures, than the one in seamanship. The one in seamanship is looked upon very much as a fluke, but the other is a thing which he grinds up for, and if he gets it he gains three or four years by it. That is what I object to—that the fact of his having been superior in mathematics should put him above his fellows who may be better practical seamen. Lieutenant Tupper also described to us the course of cramming of some of the Sub-Lieutenants, and I have no doubt that he gave a very correct description of it. Of course these are only the ones who went to *scrape through*. I have only been a short time at the College, but as far as I have seen, I imagine that a great many who go there just go there with the idea of scraping through. That is really all they think about—scraping through, and if they cannot do that, they are sent about their business, so that I think it really is a question of "scraping through," and by far the majority, I believe, get "thirds." A few go in for first class, appreciating the value of it, and of course

some of them get it, but those are a very small minority. Perhaps they might be able to apply their mechanical knowledge afterwards, but the majority get a certain fixed amount crammed into their heads, and it seems to me to be rather a waste of time. I believe the time they spend at College would be better spent in going up and down the Thames in penny steamers (I am not joking), because in that way they would learn the real practical art of doing certain things. Or they might have three months in barges and three months in penny steamers; they would then learn something which they could apply to their own profession afterwards; but the mathematics, in which they "scrape through" with their "thirds," they cannot apply, not one in ten of them. Lieutenant Tupper said that mathematics were necessary to understand the various mechanical contrivances of a ship in the present day. Now I do not think it is necessary that a Captain should understand all this. I think, as Admiral Hamilton said, if the Captain knew too much, he would be always going down into the engine-room and humbugging the chief engineer. It is not necessary that he should know all these things; as long as he knows enough to see that others are not humbugging him, then he knows about as much as you can expect him to know: he cannot know everything, that is quite certain. Captain Long is in favour of the ram, and he quoted Admiral Randolph, who is a very high authority on such matters. Admiral Randolph says, "Theory may point out and even decide what the moves should be, but practice alone can make experts in their execution. As our Officers were formerly thus perfected in seamanship, so may our young ones in future in increasing numbers, and by unremitting pains and constant practice in innumerable small vessels, be rendered equally masters in handling their ships, not only singly but in squadrons." That opinion, I believe, was expressed in this Institution many years ago. Captain Colomb also said in this room, "I am persuaded that if you sent the "Alexandra" and the "Téméraire" to fight it out at sea, the victory would be not to the strongest in material power, but to the one best handled." No doubt he will endorse that opinion now. I am very glad that Professor Lambert came to give us a purely mathematical view of the subject. I am sure every one must have been very pleased with what he said. It was all undoubtedly true from his point of view, but I venture to think he slightly misapprehends the requirements. The point he took was that machines were all very complicated. He mentioned torpedoes and gunnery and other scientific things, and said you could not understand any of these properly unless you had a thoroughly sound mathematical education to start with. I have no doubt that is all true—that you could not explain the trajectory of a shot and all the curves and things unless you had this mathematical education; but I say it is not *necessary* that you *should* understand the curve of a shot. Let specialists take up special subjects. You cannot cram everything into one man's head. You have different subjects in science, let specialists take them up and work them out. Professor Lambert then says the theoretical course is very small, that they only have the men at College for seven or eight months, and that the course is much below the average of public schools, and I think he quoted France and Germany. Of course it appears small to an astute mathematician like Professor Lambert, but it is in addition to so many other things, and if they cannot apply it, I do not see the use of it. Touching on the general principle of mathematics *versus* practice, Professor Faraday gives a very valuable opinion. He says, "I should like a professional scholar to indicate to me what he understands by the training of the mind in a literary sense, including mathematics. What is their effect on the mind? What is the kind of result that is called the training of the mind? Or what does the mind learn by that training? It learns many things, I have no doubt. By the act of study it learns to be attentive, to be persevering, to be logical according to the word logic. But does it learn that training of the mind which enables a man to give a reason in natural things for an effect which happens from certain causes? or why in any emergency or event he does or should do this, that, or the other? *It does not suggest the least thing in these matters.* It is the highly educated man that we find coming to us again and again, and asking the most simple questions in chemistry and mechanics." That is Professor Faraday's opinion of a mathematical training pure and simple, by itself—that it does not make a man practical. Professor Carpenter says, "Mathematical training exercises the mind most strenuously in a very narrow groove. It starts

with axioms which have nothing to do with external phenomena, but which the mind finds in itself; and the whole science of mathematics may be evolved out of the original axioms which the mind finds in itself." I quote these two opinions to show that mathematics by itself, unless applied, is not of much use, and if they only get a certain fixed amount crammed into them, I think the time is more or less wasted.

Professor LAMBERT: Those opinions of Faraday and Carpenter are all alluding to pure mathematics. My remarks referred only to applied mathematics, or the study of the laws of natural forces and machinery.

Captain FITZGERALD: I understand that applied mathematics comes after simple and pure mathematics, and I fancy that the large majority of Sub-Lieutenants never arrive at applied mathematics at all. Admiral Hamilton asks whether pilots could handle six ships. I do not know any man who could handle six ships in the way I mean. He then quotes Admiral Hornby, whom we all recognize as one of the finest sailors of the present day, taking his fleet out of harbour in close order and hoisting a signal just in time to avoid a collision. That of course showed a master-mind, but it scarcely takes away from the credit of the pilots.

Admiral HAMILTON: I did not wish to take away any credit from the pilot, but I asked whether, with all his training with regard to one ship, he could handle six ships anywhere?

Captain FITZGERALD: I do not suppose he could. The reason I mentioned the pilots was to show what training would do. The wonderful facility with which the pilots work the ships is attained simply by practice: they have no high mathematics or science, nothing but practice. Admiral Hamilton does not agree with my last paragraph, which is that naval Officers should not discuss politics. My view has always been that a naval Officer ought not to have any politics at all. I think he is a servant of the Crown, and once he begins to dabble in politics, or in questions of expenditure or economy, he is going out of his way. No doubt we all have one view, namely, that the country does not spend money enough on the Navy; we are all agreed about that. But if the naval Officer once begins to dabble in politics he rather involves himself; he has a leaning towards one particular Government, and expects to get an appointment out of them. Now I think the Navy ought to be entirely clear of that sort of thing. The less we dabble in politics the better. I do not think it is necessary for the well-being of our profession. Captain Colomb gave us some scientific views on the subject. All those things to which he referred would be brought out practically by the training which I propose. It is all very well to draw them on paper; you can make curves, you can make war-games and plans, and you can study all these Russian plans, but if you had all the Sub-Lieutenants at Greenwich here and explained these plans, and let them work them out, and explained the curves to them, it would not do them much good. It would not do them any harm, but it would not do them as much good as one day's practice in ramming in gunboats, or in the penny steamer as I suggest. Captain Colomb touched on an engagement off Cuba, but the Battle of Lissa might be quoted as a case for ramming, where the Austrian Admiral's maxim was "Go at everything gray!" And he went at everything gray till he hit something, and then he sank an enemy. He also touched upon the pilots and pointed out the great speed at which ships would go in action as being very different to that at which ships are piloted into harbour. You would have to learn the one as much as the other, but pilotage would not be a bad training. You cannot go at full speed always with your iron-clads in difficult manœuvres; you would sink one a week if you did. You must have some way of practising with dummies. I think Admiral Stopford hit the nail on the head exactly. It is a question of age. There is not *time* to learn all these things. Officers would have to live to be 100 years old before they were Lieutenants. There is not time if they go to sea at sixteen to cram in the practice and theory of everything. It is only a question how much you can get in. You cannot make life longer than it is; you must put in the most useful knowledge and get it out as you can. Captain John Colomb touched upon manœuvring and quoted "The best, and nothing but the best." I think that this training that I propose is the best you could have for a fundamental training for starting the young people with. You cannot go ramming about with big ships, as I said before; that will come afterwards. I

am much surprised to find that Professor Laughton, who is a great professor of mathematics, should agree about the necessity of practical training, and I think his evidence is almost, if I might be allowed to say so, the strongest that has been given, coming as it were from the opposition camp. It only remains that I should thank you for your kind attention.

The CHAIRMAN: Gentlemen, I am sure you will all most heartily agree with me that Captain Fitzgerald has given us an admirable paper, and upon which we have had a very instructive and prolonged discussion. I think he has answered the various questions very fully. With regard to the instruction for naval Officers in manœuvring, I think the paper shows that it is intended only for Sub-Lieutenants, and not for the senior branches; it is simply a beginning. He spoke of the Portsmouth Harbour pilots merely as an illustration of the perfection which may be arrived at by practice. It is their practice to bring ships in and out of harbour, and they do it in a manner which cannot be excelled. I think when he came to politics he did not mean to exclude altogether political knowledge, but what he meant was, that we have nothing to do with party politics. Neither have we. The Navy belongs to the entire State. It is our duty to serve the nation, and we have to look straight before us as to how best to do it with the weapons we have at our disposal. And if we recognize that duty to be greater and more urgent than heretofore, inasmuch as the protection of our water-borne food supply is imperative; and if we believe that we have comparatively a smaller number of ships with which to carry out these increased and very important duties—well, the naval Officer must all the more earnestly endeavour to use them to the very best advantage, and I do not see how we can get the best possible use out of them unless we have some such system of training as Captain Fitzgerald has proposed. I am sure I may offer in your names our hearty thanks to Captain Fitzgerald for his valuable paper.

Friday, February 8, 1884.

VICE-ADMIRAL H. BOYS, Member of Council, in the Chair.

PRESENT POSITION OF THE ARMOUR QUESTION.

By Captain C. ORDE BROWNE, late Royal Artillery, Lecturer on Armour Plates, Department of Artillery Studies, Woolwich.

THE chief object of this paper is to call attention to features in the present position of the armour question that appear to be peculiar and of great importance. In support of the data on which such conclusions are based, I propose to give, as briefly as possible, the results of certain experiments conducted during 1882 and 1883, distinguishing as in previous papers between the effects produced on soft and on hard armour. By *soft* armour I mean armour which yields by perforation. By *hard* armour such as cannot be perforated and is destroyed by breaking up.

The experiments I propose to notice are: (1) Krupp's Meppen trials; (2) the Italian Spezia plate experiments with the 100-ton gun, at the end of 1882; (3) the trial of compound and steel plates at St. Petersburg, at the end of 1882 and the commencement of 1883; and (4) the engineer plate experiments at Shoeburyness in August and September, 1883.

Krupp's Meppen plate trials took place in March, 1882. They consisted wholly in trials as to the perforation of soft armour either directly or obliquely. A 5·9-inch gun was fired twice at two 7-inch plates of wrought iron with 10 inches of wood in between. That plate is represented on the diagram[1] (Pl. I, Fig. 2, "horizontal section," Fig. 3, "front view,"). The shot weighed 109·6 lbs. (49·7 kg.). The first was fired with a charge of 39·68 lbs. (18 kg.), and the second 37·5 lbs. (17 kg.). The second one had a velocity of 1,750 feet, its striking energy was 2,328 foot-tons, and it had sufficient work to have penetrated 11·65 inches of iron in one thickness, or I suppose about 12 inches of iron in two thicknesses. It went through the entire target and passed on up the range 328 yards uninjured. That is to be accounted for by the circumstance that the wood between the plates was much too thick. The plates were good, but if the wood is sufficiently thick to allow the point of the projectile to get clear of

[1] The figures have been photographed from blocks kindly lent by the Editor of the "Engineer," in which paper reports of the trials appeared.

the bent and broken edges of the front plate before it meets the hinder one, then the maximum resistance is not offered by the plates. Experiments at Shoeburyness established the fact that the best thickness was somewhere about 5 inches, which prevents one plate jarring on the other, and yet does not allow the projectile to get clear of the broken pieces of one plate before it comes to the second one. In that way I understand Colonel Inglis to expect that this shot thus fired might get fairly through these plates. That Krupp's projectiles did more than this may be perhaps owing to their excellence.

The second experiment was one of oblique fire (*vide* Pl. I, Fig. 6). The same gun was fired at an angle of 35° on the normal, or 55° with the plate, against a plate 7·9 inches (20 cm.) thick, with a backing of 9·84 inches of wood, and 0·98 inch of skin. Two rounds were fired with charges of 39·68 lbs. and 37·5 lbs. The latter gave to its projectile a striking velocity of 1,750 feet. It had sufficient work to have penetrated 9½ inches at the striking angle, supposing the projectile to "bite" properly; but at so oblique an angle it has been found that the projectile has to be more than a match for the plate, generally speaking, to bite, and therefore the penetration was unusually good.

There were other incidental features in Krupp's trials worthy of notice. For example, he tried common shells made of steel, the object being to get a thinner shell with a larger bursting-charge, or, on the other hand, to make a shell with a much stronger envelope, so that there should be greater resistance when the shells burst. In some experiments—the "Shannon" trial for one—shells have *broken up* instead of bursting inside the plates at which they were fired, and the result has been but small. Thus there is an advantage in having a strong envelope: or, of course, the advantage may be taken another way, by having a very much larger charge—how very much larger you may see from the fact of a long 8·27-inch "torpedo" shell containing 106 lbs. of powder. You can hardly conceive of a shell 8¼ inches in diameter containing 106 lbs. bursting-charge. This, no doubt, is a feature which must receive great attention at some time in this country.

The Spezia trials of last November were made as to hard armour, and consisted in trials of compound plates that were ordered for the "Italia" from Messrs. Cammell, in competition with other compound plates from Sir John Brown and Co., and steel plates from M. Schneider. The dimensions of all were the same—18·9 inches thick, 10 feet 10 inches long, and 8 feet 7 inches wide (*vide* Pl. II, Figs. 1 and 2, for section). Cammell's plates had steel faces made on Wilson's patent, and Brown's plates on Ellis's patent, the back of each being wrought iron, and the front, for about one-third the thickness, steel. The compound plates had somewhat harder steel faces, having rather more carbon in the steel than in Schneider's steel plate, which was entirely of steel containing about 0·45 per cent. of carbon. It was not rolled. It was made from a very large pile 7 feet thick, hammered down to 19 inches thickness under a

PLAT

FIG. 18.
ROUND 2.
SHOT POINTS FROM
BROWN'S PLATE

FIG. 17.
ROUND 1.

FIG. 12.
5TH ROUND 2ND ROUND AT BROWN'S PLATE.

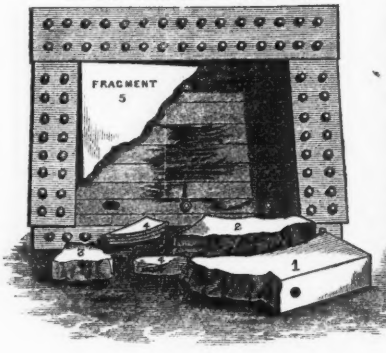


FIG. 14
6TH ROUND—2ND ROUND AT CAMMELL'S PLATE

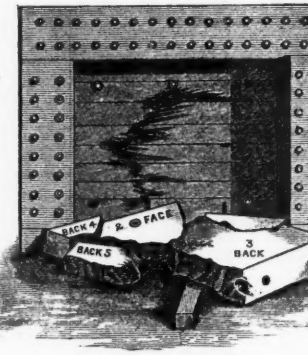


FIG. 24.

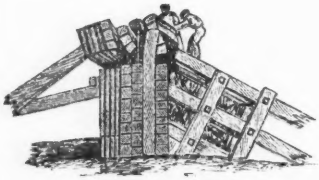


FIG. 26

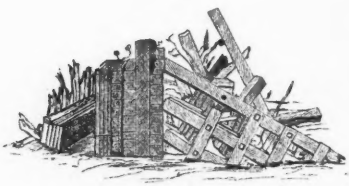


FIG. 25.
8TH ROUND 4TH ROUND AT
SCHNEIDER'S PLATE

FIG. 32.
BROWN'S PLATE AFTER 1ST BLOW.

FIG. 33.
SCHNEIDER'S PLATE AFTER 2ND BLOW.

FIG. 31.

FIG. 30.

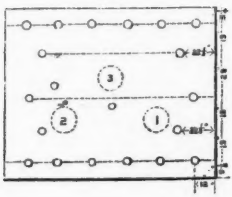


PLATE I.

14
AT CAMMELL'S PLATE.

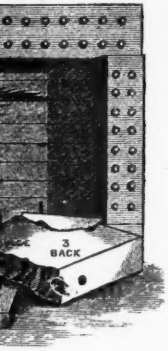


FIG. 1

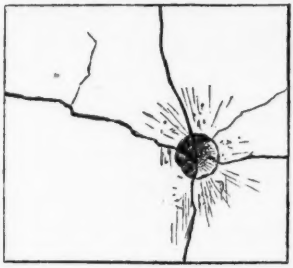


FIG. 2

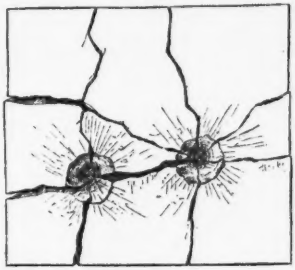


FIG. 3.

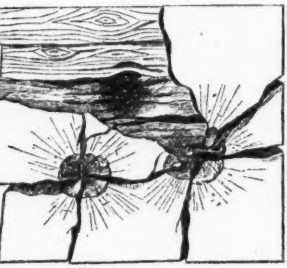


FIG. 3.

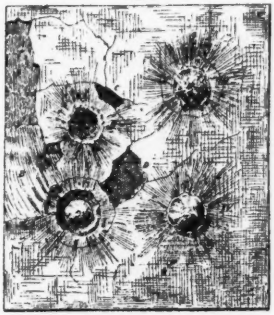
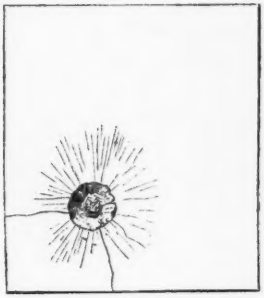


FIG. 4.



W.

LOW.

FIG. 2.
HORIZONTAL SECTION

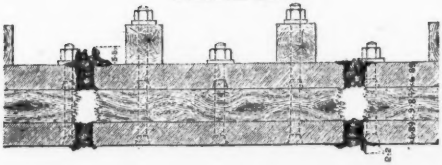


FIG. 3. FRONT VIEW

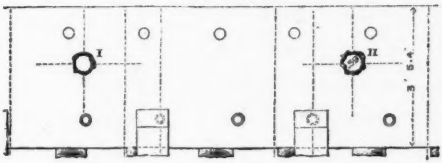
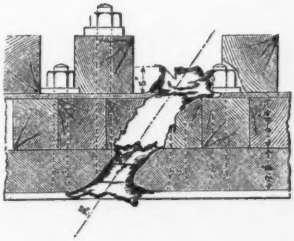


FIG. 6



PLATE

FIG. 19.

7th ROUND. 3rd ROUND AT SCHNEIDER'S PLATE.

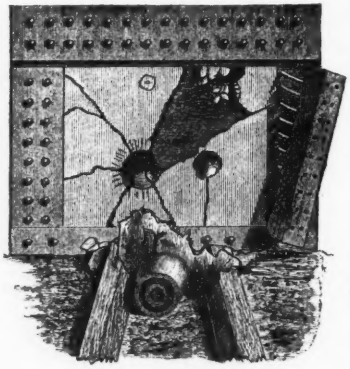


FIG. 16.

POINT OF SHOT SET AND FLATTENED INTO CAMMELL'S PLATE. ROUND 2

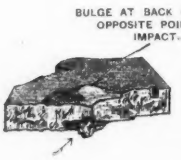


FIG. 2

SECTION OF PLATE

FIG. 13.

PIECES OF BROWN'S PLATE ASSEMBLED.

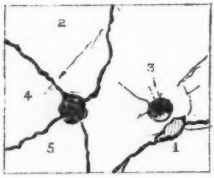
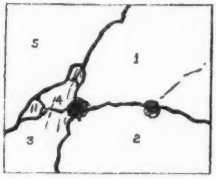


FIG. 15.

PIECES OF CAMMELL'S PLATE ASSEMBLED.



THE BACK AND FRONT OF THIS FRAGMENT DIFFER A LITTLE IN SHAPE HERE.

FIG. 11.

BACK OF SCHNEIDER'S PLATE.

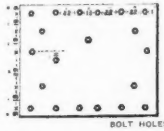


FIG. 4.

ROUND No. 1.

FIRST ROUND AT CAMMELL'S PLATE.

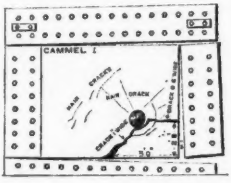


FIG. 6

ROUND No. 3.

FIRST ROUND AT BROWN'S TARGET.

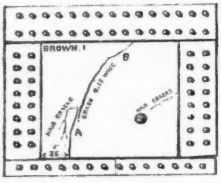


FIG. 10.

BACK OF CAMMELL'S & BROWN'S PLATES.

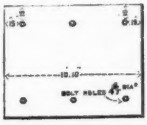


FIG. 5.

ROUND No. 2.

FIRST ROUND AT SCHNEIDER'S PLATE.

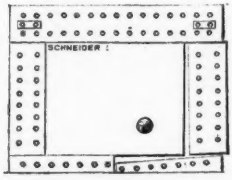


FIG. 7.

ROUND No. 4.

SECOND ROUND AT SCHNEIDER'S PLATE.

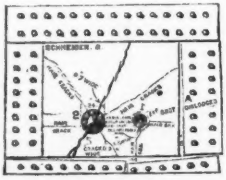


FIG. 9.

VIEW OF SHOT'S HEAD FROM A.

VERY LITTLE APPEARANCE OF CHILL.

FIG. 3

POINT OF No. 2 SHOT DISLODGED FROM HOLE. FIG. 7.

PLATE II.

PROFILE ELEVATION OF TARGETS.

FIG. 1.

END VIEW OF PLATES AND SUPPORTING FRAMES.

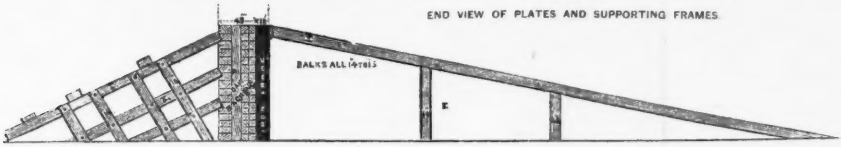


FIG. 2.

SECTION OF PLATE AND BACKING.

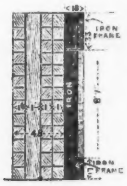
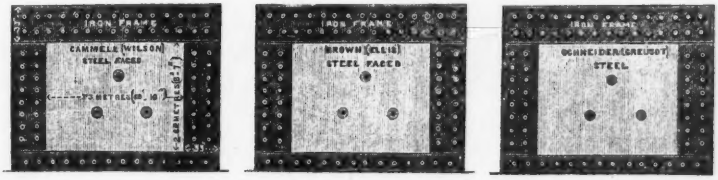


FIG. 3.

FRONT ELEVATION OF COMPETITIVE PLATES.



SCALE OF FEET FOR FIGS. 2. 3. ETC.

FIG. 29.

FIG. 21.

FIG. 23.

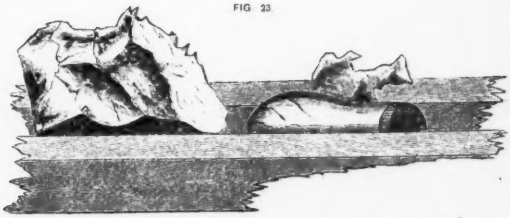


FIG. 22.

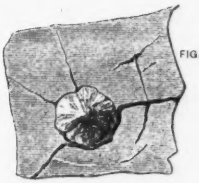
PLATE.

FIG. 20.

FIG. 34.

FIG. 38.

FIG. 39.



S PLATE.

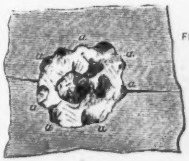
FIG. 28.

FIG. 27.

FIG. 35.

FIG. 36.

FIG. 37.



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100-ton hammer. In very thick armour it is very difficult to get the quality preserved through to the centre of a large mass. It is important then to note that that was the way in which these plates were made. Schneider's target was held up with twenty bolts, and the others with six bolts each only. They fired, as they always do at Spezia, precisely similar rounds at each target one after the other, using the 100-ton muzzle-loader. The first round was fired with a charge of 328·5 lbs. and a 2,000-lb. shot at a low velocity of about 1,222 feet, thus reduced so as to be something under a match (on the perforation base of calculation) for the target. Its stored-up work was 20,710 foot-tons. It was capable of penetrating about 19·33 inches of iron, that is to say, it was a match for the thickness of the target had the target been iron. Of course, each target being compound metal, it ought to have been equal to about 5 inches more, that is, to about 24½ inches of iron, and the shot was therefore not a match for it in penetration. The first shot being fired at Cammell's plate (*vide* Pl. II, Fig. 4), the head was buried in it, and those cracks which you see upon the diagram were made, the corner being detached. A similar round was fired at Brown's, only that the effect was a great deal less (*vide* Pl. II, Fig. 6); and at Schneider's the shot lodged apparently without the slightest crack anywhere (*vide* Pl. II, Fig. 5).

The next round was fired at each with a charge of 478·3 lbs., having sufficient work to perforate the targets; that is to say, the shot had enough work in it to penetrate 24·7 inches of iron. The first round so fired had 1,545 feet striking velocity, intended to be equivalent, I think, to the perforation of 19 inches of compound armour. The stored-up work was 33,100 foot-tons. The effects produced are shown on the diagram. Cammell's plate was broken up into four or five pieces (*vide* Pl. I, Fig. 14). The whole plate was brought down, the bolts giving way. If you assembled the pieces, they would have the form represented in that diagram (Pl. II, Fig. 15). In the same way a shot was fired at Brown's plate and brought down part of the target: one corner remained, hanging by a bolt (*vide* Pl. I, Fig. 12). The fragments are shown assembled in Pl. II, Fig. 13. The second round at Schneider's produced the effect shown in Pl. II, Fig. 7. Of course, the apparent difference between those results is very great, and is mainly due to the fact that Schneider's target is held up by bolts, whereas the other targets not being sufficiently bolted fell on the ground, but, nevertheless, Schneider's plate held better. The cracks are peculiar. I do not think they show the same complete fractures as the others, and if you had looked at the section of the iron you would have seen that the steel had a fibrous tough look about it. They then fired a steel projectile, thought to be a Whitworth. It had a striking velocity of 1,538 feet and about the same stored-up work as before, viz., 34,080 foot-tons—about a match in penetration for the target. A great piece of steel was brought down, the projectile was flattened and bounded back, the top frame round the target was thrown to the front so as to overhang the face (*vide* Figs. 19, Pl. II, and 24, Pl. I). Part of the plate was driven into the back and part brought down

with the shot, which rebounded and lay in front (Pl. II, Figs. 20 and 23). An inspection of those pieces of plate would give you the idea of its being remarkably good metal (*vide* Pl. II, Figs. 21 and 22). It was afterwards stated that the projectile was not a Whitworth's shot, but one of Terre-Noire manufacture, and sent in mistake for a Whitworth.

One more round was fired. Of course the plate was getting demoralized, and it is hardly worth looking at the result in Pl. I, Figs. 25 and 26. The projectile was a San Vito cast steel shot, and that projectile broke up in a very different way to the last mentioned. The head appeared good, but the body bad: the difference being accounted for by the head having been tempered in oil.

The St. Petersburg experiments began almost on the same day, and were carried on as a competitive trial between Cammell's steel-faced and Schneider's steel plates. In each case, the first shot fired was the heaviest. An 11-inch breech-loading gun was fired at 12-inch plates, 8 feet by 7 feet, and the striking velocity of the first round was 1,506 feet, the charge being 132 lbs. English: the weight of the shot was 553½ lbs., the work in the shot was 8,704 foot-tons, and the power of perforation equal to about 16·3 inches of iron—just about a match for the target. The first round fired at the Schneider plate cracked and broke it, as shown in Pl. I, Fig. 1. The next was fired with 81 lbs. of powder, a striking velocity of 1,167 feet and 5,228 foot-tons work (Pl. I, Fig. 2); it struck it with a power of perforation of 12·21 inches of iron; and the third, with the same, broke a quarter of it away (Fig. 3, Pl. I). The Schneider plate again was bolted up with a great many bolts, whereas the Cammell had only four bolts. The first round being fired at the Cammell plate with a charge, &c., corresponding to the first round at the Schneider, the projectile of course broke up, as in the previous rounds. The head remained embedded in the plate, and very slight cracks were made (Pl. I, Fig. 4). The next round, fired with a charge, &c., as in the second round at the Schneider plate, detached the plate, which fell on its face. When it was picked up surface injuries were found to have been produced. The steel-faced plates are apt to have more or less concentric cracks; while, as far as my experience goes, concentric cracks are not produced on a steel plate, but, on the contrary, all the cracks are radial. Then they mounted the Cammell again and fired at it, with the same reduced charge, with the same sort of effect, until they eventually got four shot planted on it, and obtained the result shown in Pl. I, Fig. 3A, parts of the face being scaled off; but the plate holding together and having a good deal of work left in it.

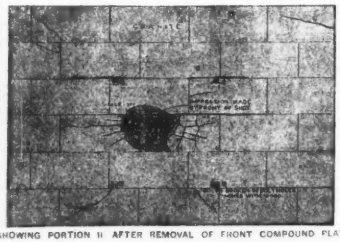
In this case there is no doubt the Cammell compound plate has beaten the steel plate; but in the case of Spezia the steel was the better of the two. There is little doubt that at Spezia Schneider's plate was specially made for the programme of experiments. The Cammell plate was supposed to be a sample plate, exactly corresponding to those that would go on the "Italia."

On Tuesday, August 22, 1883, an experiment of great interest, especially to England, took place at Shoeburyness. It was carried

FIG. 1.
OLD PLATES TO KEEP THE CONCRETE FROM RISING.

FRONT VIEW OF TARGETS

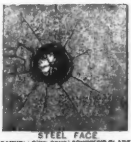
FIG. 2



SHOWING PORTION II AFTER REMOVAL OF FRONT COMPOUND PLATE

FIG. 3

FIG. 4



STEEL FACE.
CAMMELL S(WILSON) COMPOUND PLATE
FRONT VIEW REMOVED FROM PORTION 2

FIG. 5.

IRON BACK.
CAMMELL S(WILSON) COMPOUND PLATE
BACK VIEW

FIG. 7

SHOT FROM WROUGHT IRON PLATE PORTION 2

FIG. 6.

SHOT FROM GRANITE PORTION 1

FIG. 8.

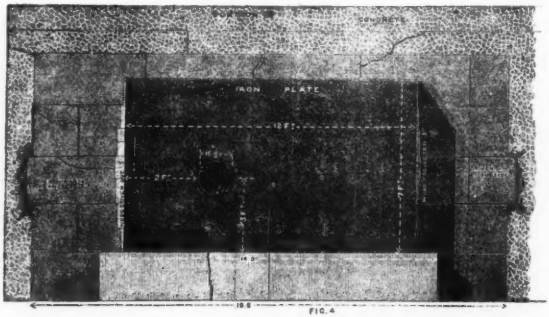
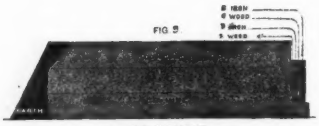


FIG. 4

FIG. 9



END ELEVATION

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out by the Royal Engineers with a view to testing the amount of protection afforded to granite forts by iron plates. The general nature of the work tested is shown in the accompanying sketches (Pl. III, Fig. 1).

The shields fixed on the face of Portions II and III are as follows: that on No. III, against which the first shot was to be fired, consists of two plates of 8 inches thickness each, of wrought iron, sandwiched with 5 inches of wood behind each, made up of two thicknesses, that is, 2½-inch planks laid horizontally, next behind each plate, and 2½-inch planks behind them placed vertically (Pl. III, Fig. 9). The dimensions of each plate were as follows: length 12 feet, height 7 feet, and thickness 8 inches. They were supplied by Messrs. Cammell. They were held in their place by six bolts, on the Palliser English system.

The shield on Portion II consists of 12 inches of Wilson's steel-faced iron, in a plate 7 feet by 7 feet held up by four bolts, fixed inside an iron frame, as shown in Figs. 1 and 2. On the top of the work was laid a quantity of old broken plating, to keep the masonry and concrete from rising under the force of the blow—(*vide* Fig. 1), at Portions II and III. Structures of concrete would hardly attain their full strength for many months, perhaps years to come, and you must allow for this in this trial, which it will be seen was a very severe one.

The gun employed was the 80-ton gun, M.L., which was mounted at 200 yards distance. One round was fired from it at Portion III—iron sandwich on granite. A projectile weighing 1,700 lbs. was fired with a charge of 450 lbs. of pebble powder, with a velocity of 1,588 feet. This implies a total amount of stored-up work of about 29,730 foot-tons, or 594·4 foot-tons per inch circumference, representing a power of perforating about 25 inches of iron. The shot was a service Palliser chilled iron projectile, about 3 feet 8½ inches long, fired without bursting charge, the radius of the head being about 1½ inches diameter. The shot struck a point 3 feet from the bottom of the plate, and 3 feet 8 inches from the left end looking at it. The effects were as follows:—The shot cut a clean hole, passing through both plates, and breaking up during penetration, turned rather to the left, the point reaching a depth of nearly 10 feet, measuring from the front face of the iron. The plates behaved admirably, the hole being cut almost without any apparent effect in the surrounding portion of the plate. The wood was driven outwards, 5 inches of the ends of the horizontal planks being thrust out beyond the plate at the left end, and 3 inches on the right. The granite was pulverized all round the projectile for some distance. Cracks were visible in the granite in front, as shown in Fig. 8. They will be observed to radiate from the point of impact, speaking generally. The stones of the course through which the shot passed are, like the layers of wood, forced longitudinally, left and right, projecting 3 inches beyond the other at each end of the squares of masonry, Fig. 8. One or two cracks also were visible in the brickwork lining of the small cross passage behind the part struck. The bolts do not appear

to have suffered, and the general structure shows little effect beyond what is here mentioned. (See Pl. III, Fig. 8.)

A velocity of 1,100 feet ought to be sufficient to enable this projectile to perforate 16 inches of iron alone.

England is the only Power that has employed wrought iron to any considerable extent in coast forts, chilled cast iron having come in generally abroad. An experiment, therefore, that shows that wrought iron behaves well is specially satisfactory to us as a nation, and surely this is the case here. The iron has offered a great resistance, and it has suffered only locally. The latter is, of course, important as affecting the further powers of resistance of the fort. A shield to resist repeated blows of the 80-ton gunshot must of course be exceptionally strong. When it yields it yields locally, and leaves still a good front protection.

The second round was fired on September 11th at Portion II, the steel-faced plate, &c. The projectile was in this, and in every other case, a Palliser shot weighing over 1,700 lbs., the striking velocity being something under 1,600 feet. The effect is seen in Figs. 3, 4, and 5, which show the plate, and in Fig. 2, which shows the masonry behind it. It will be seen that the plate stood wonderfully well. The shot broke up, its head being fixed in the plate. (See Figs. 3, 4, and 5.) The plate was bent and bulged, the bulge and shot being pressed unusually flat against the masonry supporting the plate. There were great annular rents immediately round the shot, where much violent work must have been done, the radial cracks were nearly all fine hair cracks—the depth of the most important may be seen in Fig. 3. The bolts stood well, holding the plate up. They were subsequently broken to enable the back of the plate and masonry to be examined. Fig. 2 shows the granite with the indentation and cracking made by the blow. This, it may be seen, is very slight, the deepest impression is that made by the shot point at A. The spring of the plate has opened the joints at the upper bolts B B, and if the side view (Fig. 3) be examined, it will be seen that a tremendous strain must have fallen on these bolts. Crack C was produced by the first round fired at Portion III. Hence the cracks in the masonry, as before, nearly all radiate from the point of impact.

Taking this round as nearly the same as No. 1, we may say that about 30,000 foot-tons work have been delivered on this shield, and that a compound 12-inch plate has, under the conditions before us, borne the blow of a shot capable of perforating about 25 inches of iron.

How is this to be accounted for? The natural suggestions are inferiority in shot, special excellence in plate, or special support given to this nature of plate by hard backing. There does not appear to be any reason to call the shot bad. The plate is certainly excellent, but probably the last-named cause told most—that is to say, that very hard backing specially brings out the powers of steel-faced plates. This supports the opinion of the Italian Committee, who considered that the yielding backing at Spezia told much more against the compound plate than the steel. Anyone who looks at the indication

of concentric hair cracks which are apt to be formed on compound plates will perhaps concur in thinking that the value of hard backing to this class of armour is peculiarly great. Look at Fig. 3, and judge what would have been the effect on this plate if the backing had allowed it to bend much more. Would not the line of rupture from the point of the shot to the cracks about A have been completed? The bulged back of the plate and the shot have received a tremendous pressure against the backing. Can we doubt that if the backing had not been an extraordinary one the plate must have snapped across? I am in no way detracting from the qualities of the plate, which is apparently beautiful. It would, however, surely be impossible for any 12-inch plate to stand the blow we have to consider under any ordinary conditions. Giving it all credit for excellence, then, we have to explain why it bore much more than twice the blow that would generally smash such a plate up. I suggest the following: The plate with its hard surface and hard backing resisted the shot very sharply and rigidly; this, being a chilled shot, broke under such a shock much more easily than a good steel shot would do. In fact, under these particular conditions, a softer shot with more tenacity might have done better. Still, an enormous force was at work, breaking and tearing out rings of metal close round the shot, and actually crushing in the face of the granite behind it, and it is to be noticed that there are no detached bruises on the plate face, so that the work was delivered well at the point of impact. The plate had been cracked from the front to a depth of 9½ inches at the edge, as shown in Fig. 3, but the shot was unable to bend it back and tear open the remaining thickness from the opposite side, and so the blow was borne.

To come now to the features in the question that may appear to call for special attention. *First our system of calculating effects.*

I think the table herewith will show that in England, in Russia, and in Italy the blow is estimated on the basis of the power of the shot to *perforate*. In the case of wrought-iron armour this is undoubtedly correct, but this table shows cases of steel-faced plates where perforation was not effected, but where the action was more nearly that of fracture by an ogival-pointed wedge striking the plate and splitting it before many inches of the wedge had entered it. The effect would probably be proportional to the total energy of blow delivered on the wedge, that is the shot, but without reference to the full diameter of the shot, for that never comes into the question.

Perforation is calculated by dividing the stored-up work or energy either by the area of the cross section or else by the diameter of the shot. Either plan in a modified form is correct where the shot makes a hole whose size depends on its diameter. A shot of small diameter of course requires less energy to makes its hole than a larger one, and benefits proportionately; but in hard armour, when both of them only get their points into the plate before fracture occurs, it is difficult to see how the small diameter gives any sensible advantage to a projectile. If this objection is pressed, it is often admitted to be correct, yet the fact remains that the system of calculation just condemned is the only one

in use, as far as I know, in any country. With steel-faced targets it appears that the shot are generally matched against the plate on two standards. On the lower standard the shot has sufficient penetrating power to perforate wrought iron of the *same* thickness as the compound plate attacked (*vide* table, at Shoeburyness, Spezia, and St. Petersburg.) On the higher standard the shot has sufficient penetrating power to perforate a wrought-iron plate of perhaps 20 per cent. more thickness than the compound plate attacked (*vide* table, Shoeburyness, Spezia, and St. Petersburg). In many cases this may lead to passable conclusions, but it depends on certain relations of shot and plate being maintained. Cases may arise when it would be grossly wrong. For example, at Copenhagen, a 9-inch Woolwich gun and a $5\frac{3}{4}$-inch Krupp were fired in comparison; the former had 118 foot-tons energy per inch circumference, the latter 123. Their penetration would therefore be nearly the same, but their respective energies were 16,403 and 5,760 foot-tons. It would be unreasonable to suppose that the latter, with little more than one-third the energy of the former, would smash up hard armour to the same extent simply on the ground that, if holes were made by each shot, this would only need a smaller hole, when as a matter of fact no holes could be made.

I have here a simple kind of drop to illustrate this point, made at my request in the Royal Laboratory, Woolwich. I have to thank the Director of Artillery for having decided that it should be made at Government expense. It would be very dangerous to attempt to prove questions of impact by a toy like this, where the velocities are necessarily only those of a small fall and the substances are correspondingly fragile. We may, however, get illustrations which make questions clear and impress facts on our mind, and there is always a probability that the laws governing impact at high velocities may apply to these low ones; nay, the machine could only be made on this assumption, and any correct results must be due to physical laws which bear out the assumption. You will observe that it has the advantage of great simplicity. Having the stored-up work first in the form of WH (weight with height), instead of $\frac{Wv^2}{2g}$, we get rid of the square in the formula, and the calculation of effect is indeed simple. On the perforation system the diameter varies with the height. Thus, the weight being kept constant, the $\frac{1}{4}$-inch bullet-punch, with a drop of 1 foot, ought to have the same punching power as the $\frac{1}{2}$-inch with about 2 feet, and the 1-inch with about 4 feet drop. Thus this millboard can be perforated by the 1-inch bullet-punch with a fall of 60 inches, while the $\frac{1}{4}$-inch bullet perforates it with a fall of not exactly 15 inches, but about 17 inches, this small drop giving the same power of perforation to the small bullet as the higher one does to the large bullet. As regards *perforation*, then, through soft material, the two are equal under these conditions. But now let me substitute a hard material that yields by fracture rather than perforation. The small bullet just breaks it at 9 inches fall; the 1-inch bullet has the same *perforating* power at 60 inches fall, but surely I need not say that it will give a very much greater *smashing blow*. Yet our perforating formula would show

the two equal, but you see the larger punch is about equal to the smaller one in smashing power *with the same fall*.[1]

This is a gross case. I take it, to illustrate the error in the system. Probably in no case has the system been applied when a very serious error has been caused, but the system is wrong for hard armour, and, in a greater or less degree, must give wrong results.

It is easier to say this, however, than to suggest a right system. The physical conditions are difficult to deal with. How can we calculate the work necessary to make a crack? The commencement of a crack certainly represents more work than the completion. How can we arrive at the number to be made? Then while length in a plate makes it harder to crack it longitudinally, it is thought that it gives leverage for cracking it across, just as a long stick is more easily broken than a very short one. Altogether a number of unknown elements exist, which make the question a very difficult one. In any one given plate it may be that the total stored-up work in each shot is a fair measure of the injury done, but how are we to compare two plates of different dimensions?

I have suggested as a check on the perforation standard, that by dividing the stored-up work in the blow by the number of tons in the plate struck, we have the shock per ton of plate. This might be shown in particular cases to be as grossly wrong as the perforation standard, but, depending on rather opposite conditions, it may furnish a check on it.[2]

To apply it to the examples given on the table. The 38-ton gun at Shoeburyness was fired on July 21st, 1880, at a steel-faced plate 18 inches thick. The shot had a calculated penetration of 18·6 inches and 12,980 foot-tons energy. The plate weighed about 24 tons. Hence the blow was 541 foot-tons per ton of metal. The effect was very slight, the shot breaking up badly. At Spezia, in November last, the compound plates weighed about 31·5 tons, and the heaviest blow on

[1] The perforating equation of the drop is then $WH = \pi D \times t^2 \times K$, where W = weight, H height of fall, D diameter of bullet punch, t the thickness of sheet punched, and K some constant. We have just used it with H and D varying, but D may be used with any pair of terms variable according to what may be required. The law comes out very fairly correctly if we vary H and t, and keep the other terms constant, that is, if we try what thickness the same bullet perforates at different heights. So W may be altered, and I have tried the effect of loose weight on it with reference to Captain Palliser's jacket moving forward on his shot on impact. This board, with glass balls in a groove, illustrates curiously the different effects of the fall of balls resting loosely on each other, or, on the other hand, riveted together.

[2] The shock is probably transmitted radially from the point of impact. I think possibly the action might be investigated on a small scale by firing steel bullets at discs of steel and chilled iron, arranged in series, one series of discs of varying area, another with varying thickness, and so on.

Since writing this paper and getting the proofs in type I have received, through the kindness of the German Attaché, a report of the Magdeburg experiments, to which I had referred, by which it appears that the striking energy per ton of metal is used as a measure of the shock on chilled iron. On this occasion a Grüson's chilled shield was broken, but the pieces still held together after three blows from 12-inch steel projectiles weighing 931 lbs., with a velocity of about 1,460 feet. It had borne a total shock of 43,495 foot-tons, or 914·8 foot-tons per ton of shield.

them was 33,960 foot-tons, that is 1,046 foot-tons per ton of metal. Under this each plate broke to pieces. It is fair to say that it was the second blow, the previous one having been 654 foot-tons per ton of metal. The two together then make 1,700 foot-tons per ton of metal. At Ochta the steel plate was broken with a blow of 711 foot-tons per ton of metal. The plate tried by the Royal Engineers in August last at Shoeburyness probably weighed about 10·5 tons only; a blow of 30,000 foot-tons then implies a shock of 2,857 foot-tons per ton of metal, that is, four times as heavy a shock as any single blow at Ochta on a plate of the same thickness. This was borne without breaking the plate asunder or penetrating it. Unquestionably, then, the Engineers' Shoeburyness shield is a wonderfully good combination, by whatever standard it may be judged.

Following on from this, we come to the question of *projectiles*, *With hard armour* they break up, unless of very excellent quality. Their effect must therefore greatly depend on their power of holding together. Steel, therefore, ought in the long run to beat chilled iron. I would point out that, in this country, our experiments have been made on softer armour than we may expect to meet for the future. Even our compound plates are softer than the steel armour made by Schneider, and much softer than Grüson's chilled iron. I do not mean that the steel face is softer than that of Schneider plates; on the other hand, the surface is harder, but the plate itself is softer in the sense in which I have used the word, that is, it is more possible to punch a hole in it. At Shoeburyness, discs have occasionally been torn out of compound plates, and chilled shot have got their points completely through them. I am very much mistaken if this could be done with Schneider's or Grüson's armour. Hence it follows, from the comparative softness of our hard armour, that in this country we see efforts made to punch hard armour, which I venture to think will have no future, and we have clung longer to chilled shot than seems advisable. Sir William Palliser, in his improved shot, so far as the element of reduced diameter is concerned, contemplated making a hole, and actually did so, in a compound plate. Sir F. Abel's idea of carrying fire in a steel shell through armour is only applicable to soft armour, and it has, I think, no future on that account. Perforation in this form, or indeed in any form, is so harmful that we must recognize the fact that armour will be made hard enough to prevent it; and it may be questioned whether the successful results in punching achieved by Krupp and ourselves are not rather calculated to mislead us if we are not on our guard.

I would suggest, then, *that the development of steel shot is a pressing need in this country.* A Commission was sent recently by the American Government to inquire into the manufacture of steel projectiles in Europe, and they concluded that England was behind the Continent in this matter. The excellence of the Terre Noire projectile fired at Spezia argues that a very high standard has been attained in France, even on the gigantic scale of a shot of 17 inches calibre, weighing 2,000 lbs. In this country it is complained that makers shrink from submitting steel projectiles much over 9 inches in

calibre for competition. What is the cause? and how is the necessary stimulus to be given to the manufacture of steel shot?

The chief difficulty is the supply of plates to test shot. Manufacturers naturally shrink from being judged on the merit of shot of unproved quality, and they could hardly be expected to undergo the enormous outlay for plates necessary to investigate the matter thoroughly. It seems most desirable, then, that any available plates left from experiments should be devoted to the proof of projectiles submitted by manufacturers, not as "champion" shot on which they stake their reputation, but as "pioneer" shot whose individual excellence is not the question, but rather the lesson they teach as to the effect of certain manufacturing processes. Again, one may naturally grudge the loss of the experience that might be obtained if steel shot were substituted for the chilled iron ones at present employed in the Admiralty proof of plates. No doubt, such a substitution is a delicate matter. Until first sufficiently tested to insure against its rejection, a plate could hardly be attacked by shot of an experimental character. With this reserve, however, steel shot might, perhaps, be gradually introduced, and as their quality becomes known they might replace chilled projectiles.

Finally, experiments against really hard armour appear to be specially needed in this country. Neither Schneider's steel nor Grüson's chilled iron have ever been tried by us. It may be perhaps considered that foreign experiments have settled the question in a measure for us, that we are satisfied with the comparison of our steel-faced armour with that of Schneider at Spezia and at Ochta, and that we have no doubt as to its employment for our own ships. This, however, is only one side of the question. We need knowledge as to the behaviour of our projectiles in war against the armour employed by foreign Powers. France has the most formidable Navy, and France largely employs Schneider's steel, against which our Service projectiles have never been tried at home or abroad. As to forts, the existence of coast forts depends on the possibility of vessels attacking them, and almost without exception Grüson's chilled armour is employed abroad. We heve never fired at it. Probably not six Officers in this country have ever seen chilled iron fired at. There is some reason to fear that our chilled projectiles are unsuitable ones to attack it. In 1879 Krupp attacked a chilled shield made to represent Grüson's with chilled shot. He wished it to be beaten by a wrought-iron shield of his own. In a few rounds he was disappointed at the effect of chilled shot and replaced them by steel ones, which, in a measure, broke the chilled iron.

In 1882 I believe the French made some experiments against chilled iron shields for inland fortifications. They had adopted them, but they found the effect of steel shot so much greater than that of chilled shot against chilled iron that they rejected this material for inland works. At Magdeburg the chilled iron shield was broken by the blows of *steel* shot. The behaviour of the Gregorini chilled shot at Spezia argues more tenacity though greater softness than ours. It may be questioned whether our chilled shot are

not singularly unsuited to the attack of chilled iron forts; yet if our ships were to attack any foreign harbour they must fire these very projectiles against these very shields. Is it not reasonable to urge the necessity of making experiments against a Grüson chilled iron shield in this country? This would exemplify to the fullest extent the value of our Service shot against really hard armour as a general question. Besides which the actual structures themselves are formidable enough to make it desirable to know how best to deal with them in particular. They are not costly, and long after they have suffered fundamental fracture they would be available to test the powers of our shot to hold together on impact against hard armour.

The three features, then, on which I wish to lay stress are:—1st, the need of a better system of estimating effects of artillery on hard armour; 2nd, the need for developing the manufacture of steel projectiles in this country; and 3rd, the necessity of making trial of Grüson's or other very hard armour in this country.

I hope it will not be understood that I am urging that England is by any means generally behind other nations in the matter of artillery and armour. We alone have made 100-ton guns, and our steel-faced armour is unrivalled. In the most important experiments of all foreign Powers English *matériel* takes a prominent place. Nevertheless, we can by no means afford to shut our eyes to the elements in which we may be weak, and in which foreign Powers may be gaining any advantage over us.

TABLE *showing that in recent experiments shot have been matched against compound plates according to their calculated powers of perforation (vide Columns* 5 *and* 6), *not according to their smashing powers, for which* 9 *is suggested as a measure.*

1	2	3	4	5	6	7	8	9	10
Date and place of trial.	Gun.	Weight of shot.	Striking velocity.	Thickness of compound plate.	Calculated perforation of shot, Inches of iron.	Total energy.	Weight of plate.	Energy per ton of plate.	Remarks on effects.
		lbs.	feet.	ins.		ft. tons	tons.		
July 1, 1880, Shoeburyness.	38-ton ...	828	1,504	18	18·6	12,980	24	541	Face cracks and dents only.
1882, Shoeburyness.	43-ton ...	708·5	1,870	18	22·3	17,180	...	...	Plate completely broken up.
November, 1882, Spezia	100-ton ...	2,000	1,219	18·9	19·3	20,660	31·5	654	Large portion of corner broken away.
			1,565	18·9	25·2	33,960	31·5	1,040	Plate broken to pieces.
November, 1882, and March, 1883, Ochta, St. Petersburg....	11-in. B.L.	553·5	1,167	12	12·2	5,228	12·25	427	Portion of face detached and face cracks produced.
			1,506	12	16·3	8,704	12·25	711	
September 10, 1883, Shoeburyness.	80-ton ..	1,700	1,599	12	25·3	30,140	10·5	2,870	Plate bent and cracked severely.

Captain MACKINLAY, R.A.: I shall be glad, Sir, to make one or two remarks. With regard to the number of bolts mentioned by Captain Orde Browne, it appears that Schneider employed a large number. In the trials at Spezia and St. Petersburg the compound targets had only a few, and they came to pieces; whereas in the other experiment at Shoeburyness a few bolts were quite sufficient to hold the target up. In Italy and Russia it was remarked that though the compound targets came to pieces, they fell in large fragments. I would suggest that if the English targets had been supplied with a sufficient number of bolts to keep them up at Spezia and at St. Petersburg they would probably have been initially weakened, because an increased number of bolt-holes takes away considerably from the strength of a steel or steel-faced target. It would appear that sometimes a large number of bolts are required, but not always; the large number apparently being necessary when the backing is not hard, but comparatively soft and yielding. So far as we have evidence before us, compound armour seems best suited for use with hard backing such as granite, which can be used in the construction of forts, and it is hardly so applicable to ships. With regard to the size of steel or compound targets, it would appear that there is a great advantage in having the individual plates of large dimensions, on account of what Captain Browne has urged that the amount of "work" in foot-tons in the projectile on striking, per ton weight of target, is in some way to be taken into account in considering the resistance which can be offered; with wrought-iron plates this consideration is of very small importance. It also appears that modern targets are very thick, the joints consequently go right through, or very nearly so; whereas in the plate-upon-plate wrought-iron system there are overlaps like courses of bricks in a wall. It would therefore seem that steel or compound plates should be heavier than the older ones; this would not increase the total weight for a given area protected, but the armour would be made up of fewer parts. I believe the present armour-plates are not much above 30 tons in weight; if this could be increased by adding to the superficial area, but not to the thickness, a greater resisting power would probably be obtained. This would involve extra expense and labour in manufacture, but it *may* be a desirable feature to consider for naval armour, where the chief object is to obtain great resisting power without increase of total weight. No doubt manufacturers might object that their present plant is not sufficient, but they might be urged to increase it and to produce plates of larger dimensions. Captain Browne has pointed out the great difference caused by hard and soft backing; it will probably be very difficult to arrive at any formula or calculation of the effects of fire without taking this into account carefully. The complicated composition of the modern plates will further tend to cause difficulties in making estimations of resisting power. The lecturer has suggested that experiments on a small scale might be useful, as they would tend to indicate the direction in which to proceed in making more reliable and costly ones, and this seems a sound method.

Admiral VESEY HAMILTON: I should like to say a few words, not with regard to the main point of the lecture, but to the conclusion which Captain Browne has drawn. Every naval Officer will perfectly agree that if what he says is correct we shall go into action with untried weapons, that is to say, with guns and shot of which we do not know the effects. Now, I think it is an important point that when we go into action we should know what the effect of our shot will be upon foreign armour.

Admiral SELWYN: When, in 1870, at the Naval Architects, I drew attention to the subject of compound armour by asking them to consider the analogy of the anvil, I also proposed to use a pile-driving machine for experiments, and I am glad to see that Captain Orde Browne has carried that out so well. It is subject to certain variations which have to be considered, but they are easily eliminated from the results. For instance, the unsatisfactory results given by the short drops he will find are complicated by the element of time. Mr. Oliver Browne pointed out in 1870 that when the element of time is ignored a great many new things come in —new effects which you could not previously have predicted. Well now, with regard to the compound armour, for that is unmistakably the armour of the future, unless any other method can give less weight, for armourclad ships; I do not say what will be done with regard to land batteries, that is a question for engineers to

deal with, but the question of the weights necessarily high up in the ship's side is absolutely all-important, and he who can do with 9 inches of armour what was previously done with 13 reduces the weight so importantly that there can be no comparison drawn between the perforation or non-perforation, or any other effect on the plate short of knocking the plates to pieces in three rounds as described by Captain Browne. Now, I should like to know whether the conditions of the anvil have ever been closely observed in compound armour. I say distinctly no. The good effects have been produced in spite of the bad principle on which the work has been generally done. I see in late reports of the proceedings of the Ordnance Committee that Sir John Brown now approaches something more nearly to the analogy of the anvil; that is to say, he proposes to reduce the thickness of the steel plate in front, to fill the wrought-iron armour-plate with molten steel, which is left in a crystallized state, and thus to approach to the condition of the anvil, which is made up of a wrought-iron body, a cast-iron inside, and a steel plate applied on the crystalline particles of the cast iron. In this way, and in this way alone, can be obtained that cone of dispersion which is the only means of expending the force of a shot if you do not get complete perforation. You must do one of two things, either remove the mass of metal sideways or endways before perforation is obtained, or set up an action of the particles of the soft metal which extinguishes in a wave of not very great length the whole force of impact. In the anvil that has been done by a long and careful experience leading forward to a perfect anvil, and if we will go at once to the condition of the anvil as our starting point in compound armour-plates we shall go ahead much more rapidly and with much more experience to back us than if we began by putting on a thick piece of steel in front, which no anvil-maker would ever resort to at all. He would expect that if he put a soft iron plate behind a thick steel plate it would be of no use, neither would a thin steel plate if it were not accurately tempered on the surface. So accurate must it be that even tempering an anvil the slightest degree out of the horizontal will spoil it. If when a heated anvil is subjected to a douche of water it is out of the horizontal it is spoiled, and this bears upon what was said by Captain Browne about curved plates. If you try to harden the face of a curved plate by the usual methods it is almost impossible to harden all the surface at the same time, and consequently there is a wrong disposition of material. But there are means by which we can get this hardening without the use of any water at all. They are not very occult means; they have been used for many centuries, and I think they can be used again without much difficulty. The condition is this: a thin elastic steel surface, as hard as it can conveniently be made, for a very slight thickness, below that the less-hardened part. Then the blow must be distributed over a comparatively softer material than the steel; that is found in the crystalline particles, by means of which you must distribute the blow. Then comes the wrought iron which keeps such particles from lateral expansion. All you want behind that is an elastic backing, which will take up whatever blow is transmitted through the crystalline particles, and which is used generally by blacksmiths in the form of a wooden block. We have that big wooden block in the form of the ship, and as the ship is hollow it has a certain degree of elasticity, which communicates the efforts to the whole structure, this disperses the entire work done by the shot in a harmless way throughout the ship. You cannot, of course, do that so well with granite backing, but, however, we have little or nothing to do with the way in which batteries are built unless we are attacking them. In order fully to investigate the question it is absolutely necessary that experiments should not alone be made on Grüson's shield of chilled cast-iron or on steel armour, but that no material should be neglected, that experiments should be carried out persistently and consistently, on a scale calculated to bring out steady results, but not by jerks and impulses, for experiments carried out in that way never produce a serious result. We ought to begin at the beginning, and then to go forward until we obtain every result proposed. That can only be done by a continuous governing body. If you get a lot of different people coming in one after another you will never get such experiments as Beaufoy's and others have transmitted to posterity. They devoted half a lifetime to it. All men gain by experience, and if a new man comes in, unless he is willing to learn from the experience of the others he is only a

disturbing element, and not an assistance. I think that in these experiments the civil element should be introduced along with the military. The opinions of such men as Barlow and Longridge are of enormous value, owing to their very long association with such subjects, and they ought to be associated with the naval or the military Service to carry out such experiments. It should not be regarded as out of the question to associate all talent, no matter where it comes from. Now, what may we expect if the analogy of the anvil is carried out in its integrity in the shape of a compound plate? We may expect that instead of cracks and the breaking up of plates there will be obtained a complete resistance to the blow of the very heaviest shot, and that by a comparatively light plate. And then as to the method. I am sure this is to be done by the method which I have pointed out. I think you have begun on a good path. You have abandoned the idea of perforation in soft armour, and you are beginning to see that by proper adaptation of material you can produce complete resistance. Now we have to go forward, and I think that pile-driving machine is a splendid cabinet illustration. I should like to see that carried really into a large machine, such as a pair of sheer legs, and then we might go forward from each of these experiments to the result that they point to with powder and shot and armour-plate. But the expensive form of beginning with armour-plate and ending with pile-driving machines is one which I do not think many engineers will encourage. Captain Browne has contributed most excellent work to our knowledge of this subject. I only trust that as the thing is carried out the Navy will be kept informed, because, unless we know more about it than we do at present, we are certainly going with our hands tied and our eyes blinded into the next war. That should be avoided by every possible means, and I am sure this Institution does give through its lectures more interesting and useful information than is to be obtained in any other way on such technical subjects as are necessary to be understood in order to the lessening the cost of efficiency during war, and therefore increasing the duration of peace.

Colonel Sir CHARLES NUGENT, R.E.: I did not intend to offer any remarks to the meeting, but I should like to say a few words in reply to what Admiral Selwyn has just said. I do not think the inference he has drawn as to our commencing with the plate and ending with the anvil is quite correct. It appears to me that in the matter of wrought-iron armour-plates at least we have advanced very progressively; in fact, looking at the experiments that have been made I do not think we could, having begun from the egg, have got up to the full-grown bird, which the lecturer has said is the state as regards armour-plates, unless we had done so. I may mention also with respect to the action of the Government in this matter that the happy condition of things that Admiral Selwyn alluded to—the Utopian condition—is to a certain extent gained, inasmuch as the present Ordnance Committee has upon it a number of scientific naval Officers, and is associated with one of the most eminent civil engineers, to whom Admiral Selwyn alluded, Mr. Barlow, and another civil engineer of equal repute, and they for the last three years have had the opportunities of being concerned with or cognizant of such experiments as have been made on armour-plates, both wrought-iron and compound, and also with such experiments as have been made with projectiles and with the designs of the projectiles, and the materials of which they should be made. Perhaps with the time at our disposal it is not worth going much into detail, with the single exception of the anvil, to which Admiral Selwyn has attached so much weight. He asked if we followed out the analogy of the anvil, or went on that principle, what would happen. It appears to me what would happen would be we should have an armour-plate of unmanageable thickness and weight, because experience has shown that in the compound armour-plate you cannot secure a good result without a certain thickness of hard resisting surface. Experience has shown that from one-third to rather less than one-third is the best condition of manufacture, that is to say, rather less than one-third of hard steel face, perhaps rather more than one-third of wrought-iron backs, and then the intermediate steel between the two. With regard to the three questions which the lecturer put, I have one or two words to offer. He says the three features on which he wishes to lay stress are, "first, the need of a better system of estimating effects of artillery on hard armour." As he said, that is a most difficult question, but it has not altogether escaped the attention of those who

are dealing with the subject. At present I am bound to say that we have no exact formula for that, but we have a certain amount of knowledge which, in the absence of any formula, and such formula may be before long produced, we can make use of. In the absence of such formula we know the effect of certain projectiles on wrought iron, and we also know to a certain extent their effect on compound iron, and we are able to say within certain limits that so much compound iron is equal to so much wrought iron. Then, with regard to the second point—"the need for developing the manufacture of steel projectiles in this country"—we are all agreed that generally the principle of attacking steel-faced armour is to make use of steel projectiles. Although steel projectiles for the medium calibre of heavy guns can be produced in this country (I may remark that the manufacture of steel for military purposes in very large quantities is confined to perhaps three or four manufacturers —the Cammell Company, Sir Joseph Whitworth, and one or two other makers who have recently come into the market to compete). The manufacture of the largest steel projectiles has been thoroughly unsatisfactory up to the present because the difficulties of tempering the large masses of suitable material are so great that they, the manufacturers, have not succeeded in devising any method of overcoming them. For myself I think there is a method by which the difficulty may be met; however, it is not in being yet. Then, with regard to "the necessity of making trial of Grüson's or other very hard armour in this country," there is no doubt but that a trial is very desirable, but the fault does not altogether rest with this country. I recollect not many years ago, when I was connected in a different way with the armour of the country, having many interviews with Grüson's agent, and in the end offering to him to produce a section of armour for the purpose of competing with what we considered an equivalent of our own armour, but the offer was never accepted. With regard to Schneider plates, we have no information, at least in my recollection.

Mr. Walter Browne, M.I.C.E.: Being an engineer, and not an artillerist, I should not have ventured to intrude upon the meeting if the discussion had only taken the military side of the question; but as Admiral Selwyn has brought forward the illustration of the anvil, which is an engineer's implement, I may perhaps be allowed to say a word. It appears to me, in the illustration he has given, he has forgotten this point—that you never attempt to pierce an anvil. You strike an anvil with a hammer, and the only danger is that you may crack the anvil across by the mere force of the blow. That is not the sort of danger you have to guard against in an armour-plate. Looking at the way in which the hard armour-plates are shown in the diagrams to have been fractured, I believe there can be no question as to the mode in which it has been brought about. The head of the shot has been wedged into the face of the plate, and that has produced a flow of metal radially outwards round the head, thereby producing a zone of highly compressed metal round the shot. The squeezing outwards of this compressed metal has cracked the plate, either in radial or circular lines round it, as the case may be. I look upon the ring crack, seen round the shot in Fig. 3, as representing probably the outer circumference of that ring of hard metal. Exactly the same effect has been proved experimentally to take place in the ordinary punching of plates in a well-known series of experiments by M. Barba at Toulon. He found that great advantage arose by drilling out a thin ring of metal round an ordinary punched hole before the rivet was put in, and thus getting rid of the ring of hard compressed metal.[1] Looked at, then, from the point of view of the attacking party, it seems to me that our object should be to produce a shot which shall be sufficiently pointed to get into the plate and stop there, and at the same time shall have the maximum power of squeezing the metal outwards in all directions. In fact, your plate is broken up by a wedging action, and the object should be to find the most effectual form of wedge. Of course, the more taper a wedge is the more effective it is in

[1] It is well known that riveted plates, especially of hard iron, have a great tendency to crack along the line of rivet-holes, and from them to the edge—a tendency which seems strictly conformable to that of the steel plates here considered, and to be due to the same cause, namely, compression and flow of metal round the holes.

producing lateral pressure, and therefore at the first blush it would seem that the object would be obtained by making use of long tapering shot. But, on the other hand, the less the diameter of the shot the smaller the amount of metal that is removed for a given depth of penetration, and the less the amount of compression round the shot. From that point of view you want to have your shot as large as possible: and I would suggest that the object of any experiment on this subject should be to find out a shot which combines in the highest degree these two peculiarities—that is to say, which has a point sharp enough to wedge itself effectually into the metal, and then is large enough in diameter to produce the greatest amount of compression outwards in all directions.

The CHAIRMAN: I would like to ask Captain Browne one or two questions with regard to his paper; and I may premise by saying, as Captain Mackinlay and Admiral Selwyn have pointed out, that this question is far more important for the Navy than it is for the land service. The Admiralty, when they decide upon a type of ship required, give certain conditions to the constructors; they say the ship must be of such and such a size. The constructor has to divide his weights accordingly, partly in armour, partly in guns, partly in machinery, in coal storage, stores, &c., and whatever is taken off the one can be put on to the other; the consequence is, if we can reduce our protecting armour in weight we can put that amount into the guns, and thereby increase the efficiency of the ship. The weight to be carried is really the first consideration, or the main question in man-of-war construction. With regard to the diagram relating to the Shoeburyness trials, Captain Browne says it is established that the best thickness *for the wood between the two armour-plates is somewhere about* 5 *inches*. I would ask whether that is really an established fact, and if that answers in all cases? For instance, supposing we have 14 inches of iron in the two plates, one 6 inches and the other 8 inches, does that law still hold good? Say, with different thickness of plates, different distribution of metal in the plates, and different sizes of projectiles fired. Captain Browne also refers to the "Shannon" trial, where he says, "Shells have broken up instead of bursting inside the plates at which they were fired, and the result has been but small." I think that is rather a mistake; because, if I recollect right, the report was, that the shells which broke up were "very effective." What you want is to get the damage done inside the ship. In the cases referred to, the shell broke up on striking the plating, and the powder was ignited inside when unconfined by the act of fracture, and probably incendiary power was more developed in that way than if the shell had actually burst. I do not think, therefore, he is quite right in his observation there. With regard to the method of bolting the plates on, he gave us the number of bolts, but he did not give us how the different plates were secured to the backing. My impression is that compound plates are bolted on by screws from the rear half-way into the metal, whereas steel plates are fastened by the old system of bolts completely through, and nuts. Captain Browne has given us these conclusions for special attention: he has put the formula for calculating effects first, and then the description of the projectile after it. In my view of the case, the projectile is of the first importance, because what is it that we really want to obtain? We do not want merely to punch a hole through a ship's side, and then for a solid projectile to go through to the other side. What we want to get at is something that will go through the first side, then burst or break up into numerous pieces and do the greatest possible amount of damage to guns and men inside. He says with reference to Professor Abel's view that we propose to get a shell that will go through armour and burst inside, "Sir Frederick Abel's idea of carrying fire in a steel shell through armour is only applicable to soft armour, and it has, I think, no future on that account." I must say it not only has no future, but it has never had any past. I think there are but few cases on record in which shell have really passed through armour-plates, and then burst inside; when they have burst or broken, it has always been in the ship's side or armour itself, and the burst has not been inside the ship. No doubt, that would be a great object to attain, but I very much fear that it is not in the future. As to the method employed by the Admiralty for the proof of plates, the Admiralty proof of plates is not made to discover the perforation into the armour, but it is a standard trial of the value of the plates for actual purchase. These plates are by experiment required to offer a certain amount of resistance, and

the proofs that the Admiralty have established are simply as a trial, whether, as far as can be judged, the plates come up to contract, and whether they should be received or rejected. Now, with regard to the nature of projectiles. Many years ago, when I was first connected with the trials of armour-plates and guns, we used to try our armour-plates with cast-iron round shot. We moored a gunboat a few yards from the ship's side on which the plates were bolted, fired from our gun at the plate, and frequently obtained very different results from the same gun at the same plate. This was bewildering, and it dawned upon Captain Hewlett, then Captain of the "Excellent," that it must be something in the shot, which were of different degrees of hardness, and I believe he proposed the first steel shot that was ever made, and it was very remarkable to see the difference between the effect of round steel shot and the old cast-iron shot. That brings us to the main consideration, which is, that it is our duty to work out the question of projectiles, and whether they shall be chilled iron or steel; and, whatever they may be, we should institute a series of experiments to test what is really not only the best substance but the best form for the head of the shot for penetration. There is another point which we must not lose sight of in armour-plates and projectiles: perhaps Captain Browne can give us some idea of the difference in cost between a compound plate, a steel plate, and a soft iron plate. With regard to the land service, if one plate is not enough another can be added; but with regard to a ship it is a very different thing. We must have the best, and as we shall require them in considerable numbers, expense must to some extent be taken into consideration, but not to the detriment of efficiency.

Captain ORDE BROWNE, in reply: With regard to what Captain Mackinlay observes, I suppose it came to this, that the plates, while they fell to pieces owing to their not having sufficient bolts, had a certain advantage in the fact that they may have at all events split into fewer pieces. In taking into account the disadvantage of their not holding up against the backing, you should reckon that there was some gain in having fewer bolts as regards the actual cracking. Captain Mackinlay had previously suggested this to me, and I remember I took up the two drawings of cracks and of bolts and held them against the window to see whether the fractures which ran through this plate agreed at all with the bolt-holes, and you will find that they do appear to do so; therefore, I think there is no doubt that it is desirable not to have more bolts than is necessary absolutely to hold a plate up. With regard to the ships, I did not quite understand what Captain Mackinlay said about larger plates for ships or fewer bolts.

Captain MACKINLAY: Simply that if the plate is very large the amount of work per ton of plate would be rather less.

Captain ORDE BROWNE: Of course the question of area has to be considered, and in any investigation made it would be very necessary to try that separately from the question of depth or thickness of plate. The great point is to have only one variable at a time, and keep all the other conditions fixed. I should think if series discs of steel or chilled iron on a small scale were fired at you would see how it worked. There must be some limit as to the way in which the area affects the cracking by the shot. Admiral Selwyn evidently has had more experience in the matter of drop than most people, and I am very much obliged for what he said. It is just the small heights where you have the difficulty. I believe if I had instead of the ½-inch and inch bullets taken the ½-inch and the inch, and so dropped the ½-inch from a greater height than belonged to the ½-inch, you would have found the law come out more accurately. I did not know that Admiral Selwyn had had the idea of dropping weights to illustrate punching before; if I had I should have mentioned it. It is, however, really an obvious thing to do. With regard to the question of the anvil, it is not quite the same thing to take the blow of the hammer and to fire at it. If an anvil is to be considered a satisfactory achievement of what we want, is not there any way in which you could test it? Does Admiral Selwyn think that we could fire a steel bullet at an anvil with good results?

Admiral SELWYN: I made use of the last record of the Ordnance Committee to show that Sir Thomas Brown is making a precisely similar arrangement.

Captain ORDE BROWNE: Sir John Brown makes armour with a thin steel rolled plate on the outside. He is then perfectly certain of his continuity of

surface. With steel it is everything to have continuity of surface, and he can get the surface of almost any quality and tempering that he likes. Then he has cast metal between and wrought iron behind: but if an anvil is to be put forward as being a successful pattern of plate there ought to be some means of trying the anvil in the same way as the plate.

Admiral SELWYN: The impact is the same, whether produced by gunpowder or any other force.

Captain ORDE BROWNE: There ought to be some relation of weight, because, of course, the anvil mass is enormous as compared with any blow.

Admiral SELWYN: The mass is as regards the whole ship.

Captain ORDE BROWNE: If you take the question of the hollowness of the ship, is not the blow almost too local? An anvil cannot possibly yield locally.

Admiral SELWYN: Oh, yes, it does.

Captain ORDE BROWNE: I think practically it amounts to this, that there must be some way of putting the anvil on fair terms of comparison before one is ready to admit the application.

Admiral SELWYN: The latest and most successful experiments have been made on those lines, and the more nearly those conditions are approached the better the steel plate acts.

Captain ORDE BROWNE: With regard to what Sir Charles Nugent said, I should like it to be understood at once that my object is not in any way to point out that the authorities have gone awkwardly to work. I am only trying to point out exactly where we stand at this minute. Take, for example, the punching. I should think one may consider that the calculations for punching, considering the circumstances under which they are made, are as accurate as you can expect those kinds of calculations to be. But the same thing is wanted to a certain extent with hard armour, and I think it requires to be recognized. You remember in speaking of the unreasonableness of applying calculations to hard armour that I took a case where two shots stand at a level as regards punching, and yet one had three times the stored-up work of the other. It is monstrous to suppose where no hole is made at all that these two stand on a level. I was on one occasion before a Committee taking a case of that sort, and I was told that no one who had any knowledge would apply that sort of thing to hard armour, but looking at that table before you of recent experiments, while the circumstances are such that they do not bring out any gross mistake, yet the inaccuracy appears in degree. For example, most people are under the impression that the Ochta trial was at least as severe as the Spezia, yet there is grave reason to doubt it.

Sir CHARLES NUGENT: I had no intention of being the champion of the authorities at all; but I thought perhaps an inference might have been drawn from what Captain Browne had said that nothing was being done.

Captain ORDE BROWNE: I do not think Sir Charles Nugent mentioned Mr. Hadfield among the names of the makers.

Sir CHARLES NUGENT: I did not, but I was acquainted with Hadfield's experiments.

Captain ORDE BROWNE: With regard to those makers, Sir Charles Nugent says that they want to make small shot, that they feel the difficulty of making enormous shot of 17 inches diameter and 2,000 lbs. weight. Sir Joseph Whitworth only has done it successfully, and if that is the case, is not it a very serious thing to find that the Terre Noire Company have done so, and that Krupp can produce large steel projectiles of a great deal better quality than we can in this country? And such being the case, considering the expense there is in developing the manufacture of steel projectiles on account of the plates required to fire them at, might it not be wished that they could feel their way into the proof plates at the Admiralty? Of course I am aware that the primary object of proving plates is to get fit ones; nevertheless, I believe that the proof has sometimes gone on considerably past the point of rejection. When that is the case I wish that steel projectiles could come in, because if you could develop them without expense to the country it would be a great matter. I suggested that once, and I was told that makers were very shy of making these shots, and I tried to point out that they were very shy of making shot on which their reputation was to depend, but that they would be ready to do so in

the form of experimental shot not put forward as champions at present. I am told by some makers that they would be very glad to make steel shot if they could get plates to try them at. With regard to the 5 inches of wood, I believe that is considered an absolute fixed quantity, no matter on what scale you are firing, and for this reason that it wants a certain amount of padding to prevent one plate from fracturing the other, and 5 inches apparently has been found practically sufficient to do that. I think you will find that two layers of 2½-inch planks, one laid vertically and the other horizontally, are now generally used, and are sufficient to prevent the two pieces of metal from coming together, while at the same time they do not give room for the point of the shot to clear itself of the front plate before coming to the second plate. With regard to the "Shannon" experiment, I believe most destructive results for men may be caused by certain shell breaking up. The "Shannon" experiment was an extraordinary one. The effects inside were most shocking. Happily they were only on dummies. Shrapnel shell will break into a very great number of pieces from mere impact, but I am afraid that if a common shell merely breaks from impact it is apt to break in very few pieces, and that that is the reason why it is desirable that the charge of powder should burst it.

Sir CHARLES NUGENT: When you resort to steel you do so with a view of obtaining a thinner envelope of metal and a larger powder charge, and I am under the impression that the tendency of the steel envelope may be to open rather than to burst into pieces.

Captain ORDE BROWNE: That brings me to another point with reference to Krupp's experiments. Sir Charles Nugent's statement would show that you would make these steel shells rather with a view to incendiary effect than to projectile effect. With regard to Sir Frederick Abel's steel shell, there are steel shells that have been through a considerable thickness of metal and have not broken at all. And in the experiments made at Shoeburyness now and then there was just a promise of the possibility of such a thing, but nothing that could be depended upon. I think they hoped that that possibility might ripen into a certainty that you could depend upon. I think, however, that there is no chance of that on account of the soft armour giving place to hard. The bolting of the plates in each case, both compound and steel, was so nearly the same that there was not much to call attention to. With wrought-iron plates the bolts go through the front. In steel and steel-faced that is not the case; in both of these the bolt is put in from the back, entering only to a certain depth, for the reason that you must not break the continuity of the surface of the steel if you could possibly help it. I have brought these questions up in hope of calling attention to them. If anything that could be said here would end, for example, in Grüson's plates being tried, I should be very glad. I am very glad to hear from Sir Charles Nugent that Grüson had the offer to try them in England. It is important to know that he had the offer and did not accept it. If that is so, of course we are not entirely to blame.

The CHAIRMAN: It only remains now for me to return thanks to Captain Orde Browne for his very instructive lecture.

NAVAL PRIZE ESSAY.

ON AN OUTBREAK OF WAR WHAT IS THE BEST ORGANIZATION FOR DISTRIBUTING THE PERSONNEL OF THE NAVY AND OF THE RESERVES AMONG THE AVAILABLE WAR VESSELS, AND AMONG A PROPORTION OF MERCHANT VESSELS AS AN AUXILIARY TO THE NAVY?

By Captain CHARLES JOHNSTONE, R.N.

"Let reason go before every enterprise and counsel before every action."—*The Son of Sirach.*

EXPLANATORY OBSERVATIONS.—The words *personnel* and *matériel* must appear frequently in the course of this essay; as they are of common use and supply a decided want in our language, they will be treated as recognized English words.

Where necessary, to make a clear distinction between Captains and Commanders, the old term "Post-Captain" will be used for the former. It is much to be wished that this graceful and expressive title could be conferred officially.

The writer regrets that absence on active service prevents his having access to statistics and sources of information which would have enabled him to place some matters in a clearer light.

THIS very extensive subject involves of necessity a complicated scheme. It is evident that the practical working of such a scheme must, until the day of trial, remain an uncertainty, unless it be founded on past experience, and it is equally evident that any general plan of organization drawn up in advance would show many weak points when put into execution. Nevertheless this need not discourage the expectation that very satisfactory and efficient arrangements may be made in advance for the event of Great Britain being plunged into a naval war with one or more of the Great Powers.

Happily the British navy has no lack of past experience, and it is to be expected that whilst this is carefully weighed, and the altered conditions of modern warfare maturely considered, a very complete and satisfactory plan may be prepared. The details of such

a plan of organization would of necessity be examined and determined by the officials of the department to which each detail belonged, but the scheme must in the first place be drawn out as a whole and afterwards be considered in its separate parts.

When the experiences of the great war at the beginning of the present century are remembered, and when the circumstances of the present time are compared with those of eighty years back, it will be evident that in case of a great war—*i.e.*, with one or more of the Great Powers—Britain would be compelled to employ the largest naval force which at the present time is available, or which is likely to be available at any time for many years to come.

It may be taken for granted that no war between single Powers is likely to last more months in these days, than it would have done years two generations ago; it is therefore evident that the whole strength of the empire must be put forth immediately, and that there may be no time to repair disasters resulting from a state of unpreparedness. Britain must therefore stand or fall by the force it has immediately at command.

The present naval force, properly so called, consists, first, of a small number of excellent vessels of the most approved type, of a moderate number of obsolescent ones, and of a further number which from age and other causes would be of little use in war; second, of a body of Officers of whom it may safely be said that by far the greatest part are men of much experience or highly trained, and of a highly trained force of seamen and marines. The seamen, having been entered as boys and selected, may be considered as a superior representative body of a highly respectable class, but whether their naval service has made the most of their previous qualities is open to question. It may therefore be considered that there is a very fine nucleus of a great naval force.

The power for expanding and supporting this nucleus seems from our national circumstances to be, *on emergency*, very great. I say on emergency, as the general feeling of the country will require to be thoroughly roused before the greatest efforts are made. Herein lies one of the national dangers; the general public are so unwilling to trouble themselves with departmental details, that whilst insisting on a low expenditure they refuse to listen to the advice of independent experts; it is therefore extremely difficult to convince the country that any unusual effort is necessary on the approach of war, or indeed that a proper state of preparation must be kept up in peace.

The ancient Constitution requires every man, when necesary, to fight in defence of the country; and it is on the seafaring population that the duty falls of acting when necessary at sea. When, therefore, voluntary service fails, the power of compelling service remains. The moral force of this national obligation is likely in future, if properly put forward, to have weight enough to complete the number of men required without its being necessary to resort absolutely to the old pressgang, with its cruel and illegal usages.

The conditions of naval warfare, altered as they are for sea-going vessels, are not less so on the home coasts; the introduction of steam

has rendered necessary special preparations, by the provision of coast defence ships, to prevent small and sudden expeditions being directed against our arsenals, &c.; and it also requires arrangements for the defence of our ports by means of torpedoes and heavily armed gunboats. Much of this work may be performed by a force which would be of little use at sea, and it would be a suitable employment for compulsory service men.

It is not to be expected that war can be conducted inexpensively, and it is morally certain that an ample but judicious outlay at first will shorten the war and spare many lives and much money.

There may be many people who in times of peace and in ordinary circumstances would not think of serving afloat, but who from loss of employment and from hard times on shore would gladly enter the fleet in any situation they could fill. A small bounty, with a slightly higher rate of war-pay, would probably remove the difficulties that, in time of peace, are experienced in filling many landsmen's berths in the navy.

Besides the duties of offence carried on by the ships and expeditions, and the duties of the force for the defence of the home coasts, there are for war-ships two other duties which are of the utmost importance, viz., first, defence of the lines of food-supply to the United Kingdom; second, defence of the commerce generally.

The first is simply of vital importance. The enormous increase of the population and the reduction of the space of land under cultivation have entirely changed the circumstances of the United Kingdom from what they were in former wars. It has been estimated that these islands are only provisioned for three months; invasion is now unnecessary—blockade and starvation alone would reduce them.

For the second point—British shipping enjoys at present a large share of the carrying trade of the world. A considerable amount of this trade fell in to it as a result of the civil war in North America in 1861 to 1865. This war is very instructive to Great Britain, as to what might be looked for in its own case should its commerce be ill protected. Unless its merchant ships were generally safe from capture, rates of insurance would rise and neutral vessels would most certainly be preferred for the conveyance of goods. This would at once slacken the work of the British Mercantile Marine and produce stagnation in all branches of trade connected with the building and equipping of ships. The immediate effect of this on the naval resources might be very good by placing at the disposal of the Admiralty steamers, Officers and seamen, and a perfect command of private building and fitting establishments; but the permanent injury to the country by the damage done to the shipping interest would be incalculable. Hence it might well happen that a naval war undertaken slackly, although ultimately successful, might actually lower this country somewhat in the scale of nations.

It cannot, therefore, be too strongly urged—on the merits of the question alone, as well as from the examples of recent years—that Great Britain must enter on a naval war with the utmost expedition and vigour; the regular war-ships must be at once sent to the points

where they are required, and a large force of merchant steamers must be engaged to conduct convoys and to sweep similar cruizers of the enemy from the seas. Commissioned merchant vessels will be required also as despatch vessels, torpedo store ships, and telegraph ships. Transports and store ships need not be commissioned, but may be employed as heretofore; if, however, it were possible to commission some of them, great advantage to the service would result, the work would be expedited, and this department kept in a more efficient condition. In case the war were protracted the benefit of such an arrangement would be more complete.

The Crown commands readily the services of the Officers of the Royal Naval Reserve, but as to other aid from the Mercantile Marine it must be remembered that if Britain is to keep its place amongst nations its commerce at sea must be kept up, and that trading vessels which can escape enemies' cruizers will not require cruizers to protect them. Now, escaping capture depends on two things—the swiftness of the vessel and the skill of the captain; it is therefore evident that the navy will not be able to command the services of the whole of the best of either merchant vessels or their Officers.

The foregoing is a slight sketch of the general duties to be performed in war, the matters alluded to will hereafter be developed in detail, but sufficient has been said to show that the present naval force will have to be largely extended.

As the subject of this essay includes only the personnel of the navy it will be improper to allude to the materiel further than to assume that it will be at a certain force, so that the necessary personnel may be arranged for. Some explanation will, however, be necessary to show why the vessels, &c., are assumed at any particular force, and to make other points clear.

In considering this subject it will be convenient to divide it under the following headings:—

I. The different requirements,—that is, the various modes of employment of the whole force constitutionally available for defence of the empire, under the Lord High Admiral, or Commissioners for executing that office.

II. The persons now available, or who may be made so on the outbreak of war.

III. Each requirement, with the people necessary for it.

IV. The distribution of the personnel.

V. Colonial resources as to personnel.

VI. Suggestions for amending in certain points the present arrangements as to the standing personnel of the navy, &c.

Although in Chapter VI a few improvements are suggested, it will be understood that this scheme is founded on existing arrangements, that it is only a development of resources ready to hand, and that it offers no opinion with regard to most of the points of the present system.

Chapter I.—The Different Requirements.

It is certain that all of the vessels appearing on the Navy List would not at the same time be available for active service; the numbers ready and required to be manned immediately on the outbreak of war are assumed as they are given in the following lists.

The requirements may be concisely stated thus:—

A. Squadrons with the necessary auxiliary force of store ships, telegraph ships, &c., and cruizers, &c., not in squadrons.
B. Coast defence vessels, &c.
C. Transport service.
D. Employments at home.
E. Stationary employments abroad.

A. This division consists of—

	Number of vessels.
1. Ironclads—	
(*a*) Of the first order, viz., "Inflexible," "Alexandra," "Thunderer," &c.	13
(*b*) Of the second order, viz., "Belleisle," "Nelson," "Hercules," "Audacious," "Shannon," &c.	13
(*c*) Of the third order, obsolescent and small vessels, "Achilles" to "Penelope"	10
2. Cruizers, partially armoured or not—	
(*a*) Of the first order, viz., steel corvettes, "Boadicea," Euryalus," &c.	18
(*b*) Of the second order, viz., "Active," "Dido," "Opal," &c. ..	18
3. Torpedo store ship "Hecla."	
4. Sloops	18
5. Gun vessels	36
6. Despatch vessels, &c.	6
7. Gunboats	40
8. Hospital ships	2
9. Surveying vessels	2
10. Commissioned merchant vessels—	
(*a*) Cruizers	100
(*b*) Torpedo store ships and telegraph ships	7
(*c*) Despatch vessels	4

The store ships carrying ammunition, coal, &c., are not included, as they would be hired vessels (see Division C).

11. Staffs of Flag Officers.

The armed and commissioned merchant ships being used to supply a deficiency of war vessels, their duties will be the same as those of the ships with which they are classed belonging to the navy, but for convenience in enumerating them and their complements they are in this division (A) placed separately.

It will be noticed that the numbers of vessels available are assumed at low figures; this is done to avoid an overstatement of the requirements as to the personnel.

1. *Ironclads.*—(*a*) Besides ships ready, this order includes most of the ironclads now building; it is unlikely that more than the number given could be prepared for commission within some months, and then the fresh ones would only supply the place of others necessarily with-

drawn from service. The number of these vessels would probably be increased by purchase on outbreak of war; as, however, the possibility of doing so is uncertain, there is no use in making allowance specially for complements of such an additional force; they would, if necessary, be forthcoming in the same manner as for other vessels. (See Chapter IV.)

(*b*) This order is not at present being so largely added to as the first; it contains the ironclads most suitable for distant stations. Similarly to the first order these vessels might be increased in number by purchase.

(*c*) This order will only be increased by the descent to it of vessels of a former superior class, and similarly some of the vessels now composing it may be considered only fit for coast defence.

2. *Cruizers.*—(*a*) All vessels in this order are of high speed, and are especially suitable for the protection of our lines of supply and commerce, and for clearing the seas of enemies' cruizers. The number in this order will be increased.

(*b*) This order includes only corvettes commanded by Post-Captains; there are some good vessels in it, but many of them are slow in speed and much worn; they would, however, be useful where swiftness was not a necessity. This is not an increasing class.

2. *Torpedo store and telegraph ships.*—The only representative of this class at present in the navy is the "Hecla." The whole number required would be eight. (See Section 10 of this chapter.)

4. *Sloops.*— Of these, five new ones of the "Heroine" class will be useful for work similar to that of the first order (*a*) of cruizers (2); the others are well armed, but slow; they will be suitable for the same employment as the second order (*b*) of cruizers (2).

5. *Gun-vessels.*—These vessels are substantially armed, but are not of great speed; their number would be added to.

6. *Despatch vessels, &c.*—This group includes the four vessels of the "Helicon" class and two yachts; these latter would no doubt be devoted to this purpose when necessity arose. This number will have to be increased with merchant steamers.

7. *Gunboats.*—The vessels of this group would be liable to a great increase in number if the nature of the war required it.

8. *Hospital ships.*—These vessels will accompany the two principal fleets; they might be either obsolete men-of-war or large merchant steamers, but they would in any case be commissioned.

9. *Surveying ships.*—These vessels will accompany the principal fleets engaged in operations against the land; they will perform the sounding and general hydrographical work, and also place buoys and marks when required for torpedo or other operations. These vessels will not be exempt, on the score of being surveying vessels, from attack or capture by the enemy.

10. *Commissioned merchant vessels.*—(*a*) Cruizers. These will be swift vessels fit to carry guns.

(*b*) Torpedo, store, and telegraph ships. There is at present in the navy only one torpedo store ship, the "Hecla"; seven others will be required. Two of these vessels will be in the Mediterranean, and two

attached to the Channel Fleet. Two of the torpedo store ships will be also telegraph ships; each will carry electric cable enough for a short line, and be ready to grapple enemy's cables, to lay down and repair our own, and to attend to telegraphic communication. Whilst attending to telegraph duties the vessels themselves would be unable to engage actively in torpedo work; but their crews, boats, and stores would generally be available.

(*c*) Despatch vessels. These will be swift merchant vessels of classes too small for carrying guns.

11. *Staffs of Flag Officers.*—The Flag Officers are those whose flags do not fly in stationary vessels. The Superintendent of the Reserves comes into division D of this chapter. (See Chapter IV, *a*.)

B. *Coast defence vessels:*—

	Number of vessels.
1. Ironclads	6
2. Gunboats	40
3. Torpedo-boats..	20
4. Coast service vessels	4

1. *Ironclads.*—There are at present six turret ships for home coast defence; in case of the war being prolonged, and our fleets at sea suffering greatly, floating batteries would be prepared in addition for defence of the ports.

2. *Gunboats.*—These are mostly of the small one large gun type; their number could be quickly added to on emergency. In this division would come vessels especially assigned to the Royal Navy Artillery Volunteers if it were decided to employ the force in this manner.

3. *Torpedo-boats.*—The number of these is set down at twenty; it would fluctuate according to the demands for sea service, but would be quickly increased after declaration of war.

4. *Coast service vessels.*—This class includes all small paddle vessels suitable for channel and coast service, but does not take in the small yachts and harbour tenders. These vessels would be employed on their present duties, or in communicating along the coast and between the coast defence ships and the shore, &c.

C. *Transport service:*—

	Number of vessels.
1. Imperial and Indian troopships	9
2. Store and special service ships	6
3. Beach-masters and transport Officers.	
4. Hired transports.	
5. Hired store ships (not torpedo store ships).	
6. Postal and telegraph service afloat.	

1. *Imperial and Indian troopships.*—This group does not include the "Tyne" or the "Humber"; it would not be added to except by merchant ships commissioned.

2. *Store and special service ships.*—These are "Thalia," "Valorous," "Humber," &c.

3. *Beach-masters and stationary transport Officers abroad.*—These Officers are for service with expeditionary forces.

4. *Hired transports.*—The number of these would of course depend on circumstances. In case of prolonged operations much advantage would result from having some of these vessels commissioned. This has been already alluded to.

5. *Hired store ships.*—This group includes vessels carrying warlike stores, coals, provisions, &c. In cases where these vessels were to be detained or to attend the movements of a fleet, advantage would result, as in the case of transports, from commissioning a certain number of them.

6. *Postal and telegraph services afloat.*—A proper postal administration for the forces abroad, and a telegraph staff for official communications, are now a necessity.

D. *Employments at home:*—

1. Naval barracks, receiving ships, &c.
2. Gunnery and torpedo schools.
3. Boys' training ships.
4. Steam Reserves.
5. Harbour tenders.
6. Drill ships.
7. Yachts, &c.
8. Dockyards and victualling yards.
9. Hospital service.
10. Recruiting.
11. Staffs of Flag Officers.
12. Coast Guard on shore.
13. Stationary torpedo defence.

1. *Naval barracks and receiving ships, &c.*—The vessels, &c., in this section are—Sheerness Barracks, "Duke of Wellington," "Royal Adelaide," "Revenge," "Nankin," "Britannia."

When the new naval barracks at Plymouth are ready, they will probably take the place of the "Royal Adelaide," so that the number of establishments will remain the same.

In a great naval war, the staffs of the barracks and receiving ships must be kept very efficient, to perform the many and onerous duties which will fall to them. The receipt and disposal of the seamen will of itself be heavy work, and to that will be added the highly important duty of receiving, clothing, and drilling newly raised men other than novices.

As long as the present system of training Naval Cadets continues, the staff of the "Britannia" must be kept up, but on the outbreak of war the most useful course would be to send the cadets to a school on shore (the best place at all times for them), and to employ the "Britannia" for receiving and training novices. No ship is here specially assigned for training novices, but it would probably be found necessary to establish one. (See Chapters II, O, and IV, *o.*)

2. *Gunnery and torpedo schools.*—The schools will be kept in activity, though the best of their respective staffs will be withdrawn for sea service.

3. *Boys' training ships.*—These must be kept going with undiminished staffs, the more so as the boys will, in case of need, pass through in a much shorter time than usual.

4. *Steam Reserves.*—The vessels in this section are—"Asia," "Indus," "Pembroke."

Few departments will be more actively employed in war than the Steam Reserves; vessels which are far from ready for commission will be handed over to them, and these they will have to bring forward rapidly and perhaps with little external help. The preparation, care, and adjustment of the engines of all vessels passing through this department will of itself be very heavy work.

5. *Harbour tenders.*—These will be employed as at present for their duties in the home ports.

6. *Drill ships.*—These vessels must be kept efficient; the duties in connection with them will be to engage men and to drill them until convenient to send them to the naval ports.

7. *Yachts.*—This section includes—"Victoria and Albert," "Alberta," "Elfin," "Fire Queen," "Vivid."

8. *Dockyards and victualling yards.*—This section includes—(*a*) Dockyards: Portsmouth, Plymouth, Chatham, Sheerness, Pembroke, Haulbowline, Mylor; (*b*) Victualling yards: Royal Victoria, Royal Clarence, Royal William.

9. *Hospital service.*—This section comprises—

		No. of Medical Officers.
Hospitals:	Haslar	9
	Plymouth	7
	Yarmouth	2
	Haulbowline	2
Royal Marine Infirmaries:	Chatham	3
	Portsmouth	3
	Walmer	2
Royal Marine Artillery Infirmary, Portsmouth ..		3
Royal Marine Barrack Dispensary, Plymouth ..		3
Sick Quarters:	Portland	1
	Dartmouth	1
Dockyard Medical Officers		5
Victualling Yard Medical Officers		1
Greenwich College and School		1
		43

10.—*Recruiting.*—In addition to the present marine recruiting Officers, others will be necessary; they will be taken from retired Officers of the navy and marines. This branch will also include the duty of looking up and mustering the pensioners, arranging their embarkation, &c.

11. *Staffs of Flag Officers.*—This section comprises the Staffs of eight Flag Officers stationed at home.

12. *Coast Guard on shore.*

13. *Stationary torpedo defence.*—By existing arrangements it is intended that this duty shall be performed entirely by the Royal Engineers. So small a body of these is set apart for torpedo duty that it is quite certain they could not do all that would be required. It is unfortunate that a torpedo corps in connection with the navy is not already charged with this duty, which is essentially one for sea-

men or watermen,—landsmen cannot judge of many of the needs for meeting the attacks of ships and boats. No doubt this will sooner or later become the work of the navy, so provision is made in Chapter III, D. 13, for the immediate necessity.

E. *Stationary employments abroad.*

1. Dockyards and shore establishments.
2. Stationary receiving and store ships.
3. Stationary hospital ships.
4. Hospitals.
5. Vessels for harbour defence.
6. Special services.

1. *Dockyards and shore establishments.*—This does not include hospitals and sick quarters. The dock and victualling yards are Malta, Gibraltar, Halifax, Bermuda, Antigua, Jamaica, Cape of Good Hope, Ascension, Trincomalee, Hong Kong, Sydney, Esquimalt.

2. *Stationary receiving and store ships.*—These at present exist at the following ports:—Malta, Bermuda, Jamaica, Cape of Good Hope, Zanzibar, Hong Kong, Coquimbo.

In war it would be necessary to have a receiving hulk at Halifax. A receiving establishment would be necessary at Trincomalee; but *there*, being in the tropics, very little shelter is required except from a good roof, so that it would be cheaper and more convenient to build huts than to maintain a hulk.

3. *Hospital ships.*—At present there are only two floating hospitals, viz., at Zanzibar and Coquimbo; the ships are considered in Section 2, and the medical staff in Section 4 of this chapter. In time of war stationary hospital ships might have to be established at bases where land hospitals were not possible.

4. *Hospitals.*—Those with medical staffs at present are as follows:—Malta, Bermuda, Jamaica, Ascension, Cape of Good Hope, Hong Kong, Yokohama, Lisbon, Esquimalt; at Coquimbo and Zanzibar, ships, see Section 3.

At Halifax and Trincomalee the present hospital arrangements must be extended. At Gibraltar, if the military could not undertake the naval patients, it would be necessary to re-open the Naval Hospital, receiving it back from the army.

5. *Vessels for harbour defence.*—This group is composed of "Wivern," "Scorpion," "Viper," "Vixen," also two gunboats. It would be much increased in war.

6. *Special services.*—This section comprises, at present, charge of stores away from regular establishments; re-venting guns. In war the number of employments under this head would be extended. The surveying service is not here included.

7. *Staffs of Flag Officers.*—This comprises the staffs and retinues, &c., of three Admirals Superintendent abroad.

Chapter II.—The Persons now available or who may be made so on the Outbreak of War.

An important point must be borne in mind, viz., that it is not here a question of a small war, or of one sluggishly undertaken with only the half approval of the country, but of a great struggle for the safety and perhaps the independence of the empire. In such a war, commerce and the means of obtaining a livelihood would in many branches be greatly interfered with; persons of all classes being thrown out of work, they would have to seek it in fresh directions, and the employment most readily open to all would be that under the Crown. Besides this it is to be expected that patriotism and the ardour of public feeling would lead many to serve the Government, especially if this service neither required them to leave the country nor was gratuitously given.

With retired Officers called out for service some special arrangement might be necessary. These Officers would in many cases be rather advanced in age for the rank they held; it might be advisable, therefore, to give them an honorary step of rank in order to prevent their being socially or otherwise at a disadvantage with regard to the standing Officers, but they must, if necessary, perform duties of the lower rank. This is merely suggestive of difficulties that would arise, and the way of meeting them.

Considering the long time it takes from the entry of a boy until he becomes a well-trained man it may be argued that newly-raised men will be useless for a great while after their entry; but the system to be pursued in war-time, in ships with new crews, will be very different to what prevails at present. Then clearing for action and exercise at quarters will be the work of every day, and the ships being much at sea, great opportunities will occur for exercises of all sorts. It is certain that then, too, there will be no waste of time, as is too often the case in peace, in frivolous employments for the men—occupations which add something to the appearance of the ship, but nothing to her healthiness or efficiency, and much reduce the time for instruction. The forcing system of instruction which will be necessary will be what is now known as "cramming," and "cramming" does undoubtedly produce a result which lasts whilst the pressure is kept up as it would be in war.

Some of the arrangements given in this chapter may appear unpractical, but it will be remembered that the necessity is great, and the established force small. The question of the sufficiency or otherwise of the now existing personnel, both standing and reserve, is dealt with in Chapters III and IV.

The persons available are as follows:—

A. Officers on the active list.
B. Officers on the reserved or retired lists.
C. Officers of the Royal Naval Reserve.
D. Officers of the Mercantile Marine, not Royal Naval Reserve, and other persons qualified to become temporary Officers in the military branch.

E. Civilians as temporary Officers in the civil branch.
F. Royal Marine Corps.
G. People for employment in Coast Guard on shore.
H. Post Office officials for postal and telegraph services afloat.
J. The standing force of petty officers, seamen, and boys.
K. Engine-room petty officers and men.
L. Seamen and marine pensioners.
M. Seamen of the Royal Naval Reserve.
N. Royal Naval Artillery Volunteers.
O. Boys and novices.
P. Other men entering voluntarily.
Q. Men liable to compulsory service.

A. *Officers on the active list:—*

	Number now actually on the list.
Flag Officers	69
Captains	174
Commanders	219
Lieutenants	836
Sub-Lieutenants	197
Midshipmen and Cadets	325
Staff Captains	15
Staff Commanders	91
Navigating Lieutenants	91
Chief and other Gunners	316
Chief and other Boatswains	396
Chief Inspectors of Machinery	5
Inspectors of Machinery	6
Chief Engineers	220
Engineers	321
Assistant Engineers (not including those at Greenwich)	100
Engineers and Assistant Engineers for temporary service	17
Inspectors-General of Hospitals and Fleets	4
Deputy Inspectors-General of Hospitals and Fleets	11
Fleet and Staff Surgeons	164
Surgeons	184
Paymasters	200
Assistant Paymasters	169
Clerks and Assistant Clerks	101
Chief and other Carpenters	191

In considering hereafter the above numbers a deduction for casualties will be made.

B. *Officers on the reserved or retired lists.*—The effect of the reduction of the active list by extensive retirements in 1870, and subsequently, has been to fill the retired list with efficient and serviceable Officers. This made the retired list into an excellent reserve; much of that good result still remains, though every additional year will render the Officers retired at the time mentioned less fit and less inclined to serve afloat. The retirements now being due to age or physical incapacity, the value of the retired list as a reserve will in a few years be much reduced. It may reasonably be expected that a considerable number of the retired Officers would be ready to accept

appointments at home. A few retired naval instructors might be willing to undertake clerical or other duties which they were able to perform.

The Officers on the reserved and retired lists who would probably be available are as follows:—

	Probable number available.
Flag Officers	50
Captains	80
Commanders	80
Lieutenants	40
Sub-Lieutenants	—
Navigating Officers	40
Engineer Officers	40
Medical Officers	50
Accountant Officers	20
Naval Instructors	5[1]
Chief and other Gunners and Boatswains.. ..	10
Chief and other Carpenters	5

C. *Officers of the Royal Naval Reserve.*—It is not to be expected that all the Officers of the Royal Naval Reserve would be available for service on the outbreak of war; the numbers given below are those estimated as likely to be within a short time ready to serve. They may be divided as follows:—

	Numbers available.
Officers suitable to command vessels, Coast Guard stations on shore, &c.	8
Officers suitable to take the place of Lieutenants afloat	10
Officers suitable to take the place of Sub-Lieutenants	10
Officers for navigating duties	50
Engineers	1
Junior Officers	40
Honorary Officers R.N.R. for navigating duties, &c.	10

The Honorary Paymasters and Assistant Paymasters are not likely to be available afloat.

D. *Officers of the Mercantile Marine, not Royal Naval Reserve, and other persons qualified to become temporary Officers in the military branch.*—It is likely that some Officers of the merchant service, some master-mariners (unemployed), and a few yacht-owners might be ready to accept suitable positions under the Admiralty. The numbers may be taken at—for navigating duties, 20; other work not in sea-going ships, 10.

It should be understood that temporary service in the navy could give no claim to permanent employment nor to pensions, unless specially laid down to the contrary.

E. *Civilians as temporary Officers in the civil branch.*—The question of obtaining persons to perform the duties pertaining to the civil branches of the navy is at all times simply one of money, but it is to be hoped and expected that in time of war it would not be necessary to offer unreasonably large salaries in order to induce civilians to accept

[1] Not counted in Chapters III and IV.

temporary posts under the Admiralty. The employment would be as follows:—

1. As Engineers.
2. For hospital work, afloat and on shore.
3. For accountant and secretarial duties.

For numbers see Chapter IV, under the different headings.

1. *As Engineers.*—These may be engineers of the Mercantile Marine or land machinery engineers.

2. *For hospital work, afloat and ashore.*—(*a*) Medical men willing to join sea-going ships. These would probably be, for the most part, gentlemen of previous experience at sea not in the Royal Navy, and gentlemen who have recently taken their diplomas.

(*b*) Medical men willing to join coast defence ships. These might include any of the above, and also gentlemen who would not go abroad.

(*c*) Medical men willing to take service under the Admiralty in naval hospitals, &c. Many gentlemen not in regular practice would be ready to accept such employments as these.

(*d*) Unqualified medical assistants abroad, and for coast and home service. These would be gentlemen still passing through the medical schools, but who would accept service for a time. They would be required to have considerable knowledge of a surgeon's work without being qualified men. Such assistants to the regular medical Officers would be a valuable addition to the surgical staff; they might suitably be called Assistant Surgeons.

3. *For accountant and secretarial duties.*—The persons eligible for these duties will be gentlemen who have been trained as secretaries, clerks, &c., afloat or on shore, and who pass a proper test examination.

F. *Royal Marine Corps.*—The marines of both arms are essentially a corps for naval service; they would in a great naval war be in no way available as a part of the army. The number voted at present is 12,400. The number who may be counted on for service afloat probably does not exceed 11,000.

No troops could be considered as available for service afloat instead of marines as in the old war.

G. *People for employment in Coast Guard on shore.*—The persons who might be made available are mentioned in Chapter III, D. 12.

H. *Post Office officials for postal and telegraph services afloat.*—Application would be made to the Postmaster-General to supply the necessary persons from the General Post Office staff. The numbers required may be taken as follows:—for postal duties, 6; telegraph duties, 4.

J. *The standing force of petty Officers, seamen, and boys.*—This division comprises the standing force of the seamen class and all other ratings not specified elsewhere in this chapter.

K. *Engine-room petty Officers and men.*—1. Engine-room artificers of all grades. 2. Leading stokers and stokers. 3. Stokers 2nd class. This branch of the personnel is dealt with fully in Chapter IV, Division E.

L. *Seamen and marine pensioners.*—The number of these to be

drilled annually is now voted at 1,750; but as there are many other undrilled pensioners the total number available might possibly be 2,000.

M. *Seamen of the Royal Naval Reserve.*—The number of these voted, including about 380 Officers, is 18,000; the number which may perhaps be available is here set down as 9,000; it would scarcely be safe to calculate on more at first.

N. *Royal Naval Artillery Volunteers.*—These consist of three brigades. The number voted at present is 1,600; perhaps 1,200 of these might be actually available.

O. *Boys and novices.*—1. Boys who, having entered the training ships, are passed through in a shorter time than usual. 2. Novices, *i.e.*, lads of sixteen-and-a-half years and upwards, who would go through a short training and then be rated Boys 1st Class if under eighteen, or Ordinary 2nd Class if over eighteen.

P. *Other men entering voluntarily.*—These will be—1. Seafaring men. 2. Civilian servants. 3. Men for artificers and all other ratings for which persons have not been already mentioned. 4. Landsmen too old for novices, but who are ready to engage as 2nd-class ordinary seamen.

Q. *Men liable to compulsory service.*—1. Men who do not engage voluntarily, but who are liable by special enactment to serve in the navy.

(*a*) Officers and men of the Coast Guard, revenue cruizers, and seamen-riggers.

(*b*) Outdoor Officers and boatmen in the employment of the Board of Customs, and all other seafaring persons holding appointments in the public service.

2. All seafaring persons not already mentioned.

These are liable under the constitutional duty of every one to fight in defence of the country. They consist of persons in the merchant service, fishermen, watermen, &c.

Chapter III.—Each requirement, with the people necessary for it.

In this chapter each of the various requirements given in Chapter I will be considered in the divisions A, B, C, &c., and it will be shown what Officers and men are necessary to the different employments. In Chapter IV it will be pointed out how deficiencies in numbers of the regular force of Officers and men will be supplied from the standing reserves and newly entered persons.

The tables are merely intended to show the *minimum* of persons likely to be required, and to act as a guide in judging of the system to be followed in the distribution of the personnel. The complements are assumed to remain generally as at present. The ranks are those now actually employed, but substitutions in many cases might have to be made as explained in Chapter IV.

The subject of this chapter being closely allied to that of Chapter I, it has been found impossible to avoid either, on the one hand, making a confusion by running the whole matter into the first chapter, or, on the other hand, the necessity of using some repetition. The latter course has been preferred.

Table I requires no further explanation than is given in Chapter I.

TABLE I.

DIVISION A OF CHAPTER I.—SEA-GOING FLEET, &c.

	No. of vessels.	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Sub-Lieutenants.	Navigating Officers.	Midshipmen.	Gunners and Boatswains.		Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total Officers and Steam Branch.	Marines.	Other Ratings.	Complements.
								Charge of store.	Quarter-deck duty.				Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stokers.				
1. Ironclads	36	36	36	190	126	36	216	72	...	80	72	36	162	330	371	1,883	3,646	2,359	10,507	16,512
2. Cruizers	36	36	5	180	72	36	108	72	...	72	72	36	114	164	205	849	2,021	1,187	5,100	8,308
3. Torpedo store ships ...	1	1	...	3	...	1	...	2	1	2	2	1	4	9	9	36	71	35	139	245
4. Sloops	18	...	18	36	18	18	...	36	36	18	36	18	19	55	55	167	530	428	1,610	2,568
5. Gun-vessels	36	...	36	36	36	36	...	36	...	36	36	...	36	108	108	288	792	522	1,818	3,132
6. Despatch vessels	6	...	3	6	6	6	...	6	...	6	6	...	13	13	26	100	191	60	165	416
7. Gunboats	40	...	...	40	20	40	...	40	...	40	40	...	40	80	40	280	660	332	1,328	2,320
8. Hospital ships	2	2	...	6	2	2	...	6	...	6	2	2	4	6	8	30	76	50	174	300
9. Surveying ships	2	1	1	8	...	2	...	...	...	2	2	...	3	5	8	19	51	43	149	240
10. Merchant ships—																				
(*a*) Cruizers	100	...	100	100	100	100	...	100	...	100	100	...	100	300	300	1,500	2,900	2,500	9,600	15,000
(*b*) Torpedo, store, and telegraph ships	7	7	...	21	...	7	...	14	7	14	14	7	14	42	42	140	329	200	871	1,400
(*c*) Despatch vessels	4	...	...	4	4	4	...	4	...	4	4	...	8	18	36	56	142	34	64	240
11. Staffs of Flag Officers ...	...	...	...	23	...	...	...	...	...	...	60	...	8	...	...	...	91	...	171	262
		83	199	653	384	288	324	388	44	380	446	100	525	1,130	1,208	5,348	11,500	7,747	31,696	50,943

Division **B** *of Chapter I.—Coast defence vessels* (*see Table II*).—The ironclads of this division will require full complements, but they need not be supplied with such highly efficient ones as will be necessary for the sea-going vessels. They would therefore contain a larger proportion of pensioners and newly raised men; being mastless they might have fewer seamen and more marines. Similarly the gunboats could be efficiently served by seafaring men trained for them alone.

The torpedo-boats, to be of use, must be highly efficient as to their Officers and crews; there would be considerable difficulty in finding suitable Officers to command them without drawing too largely on the list of Lieutenants; probably several gunners would be found fit for this duty. The small coast service vessels might, if necessary, be commanded and manned from the Mercantile Marine.

Division **C** *of Chapter I.—Transport Service* (*see Table III*).—1 and 2. Troopships and store and special service ships. The complements of these ships will remain generally as at present.

3. Beach-Masters and Transport Officers. The numbers required of these Officers cannot be considered at all certain: they would depend on circumstances. Here they are assumed as they are given in Table III, viz., at twenty. One of these Officers is an engineer for superintending defects and repairs of the engines of hired vessels.

4 and 5. Hired transports and hired store ships. The hired vessels would be worked by hired crews, and so require no naval force.

6. Postal and telegraph services. The postal service for a large fleet or expedition must be managed on a complete system, and this would be done best by a regular postal staff. The staff should consist of officials from the General Post Office, and should be under the principal transport Officer where one was present, or under the Captain of the Fleet. The telegraph service must similarly be worked by a special staff, but it must be kept quite separate from the postal service. The telegraph officials would be attached to the telegraph ship, and would be directly under the Commander-in-Chief. The general management of the receipt and despatch of mails would be under the special Post Office staff; the distribution of letters would be performed in the same manner and by the same persons as at present.

Division **D** *of Chapter I.—Employments at home* (*see Table IV*).—1, 2, and 3. Receiving ships, &c., gunnery-ships, &c.; Boys' training-ships, &c. The necessity for keeping up the efficiency of the complements of these establishments is noticed in Chapter I, but pensioners who have been instructors will be suitable for much of the drilling, and marine pensioners may be made use of.

4. Steam Reserves. The complements of the Steam Reserve ships may be composed almost wholly of retired Officers, of Officers and others not fit for sea service, and of pensioners and newly raised men. Civilians must be entered to supply temporarily the places of the Engineer Officers and engine-room artificers, almost all of whom would

TABLE II.

DIVISION B OF CHAPTER I.—COAST DEFENCE VESSELS, &c.

	Number of Vessels.	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Sub-Lieutenants.	Navigating Officers.	Gunners and Boatswains.	Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total Officers and Steam Branch.	Marines.	Other Ratings.	Complements.
											Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stokers.				
1. Ironclads	6	6	...	12	...	6	12	6	6	6	14	27	32	117	244	183	673	1,100
2. Gunboats	40	...	...	20	...	...	20	...	...	...	40	40	40	120	280	186	654	1,120
3. Torpedo-boats	20	...	...	10	...	...	20	...	...	...	...	20	20	20	90	...	210	300
4. Coast service vessels	4	...	...	4	2	4	4	2	2	...	4	8	8	24	62	33	105	200
		6	...	46	2	10	56	8	8	6	58	95	100	281	676	402	1,642	2,720

TABLE III.

DIVISION C OF CHAPTER I.—TRANSPORT SERVICE.

	Number of Vessels.	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Sub-Lieutenants.	Navigating Officers.	Gunners and Boatswains.		Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total Officers and Steam Branch.	Marines.	Other Ratings.	Complements.
							Charge of Stores.	Quarter-deck duty.				Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stoker.				
1. Troopships	9	9	...	40	4	9	9	36	12	23	9	42	53	66	310	622	287	1,103	2,012
2. Store and special service ships...	6	2	2	13	2	8	8	14	6	8	2	14	15	24	76	194	108	457	759
3. Transport Officers, &c.		1	4	14	...	...	...	...	...	...	...	1	...	...	...	20	...	...	20
		12	6	67	6	17	17	50	18	31	11	57	68	90	386	836	395	1,560	2,791

TABLE IV

Division D of Chapter I.—Employments at Home.

	Number of Vessels, &c.	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Sub-Lieutenants.	Navigating Officers.	Gunners and Boatswains.		Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total Officers and Steam Branch.	Marines.	Other Ratings.	Complements.
							Charge of Stores.	Quarter-deck duty.				Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stokers.				
1. Naval barracks, receiving ships, &c.	6	5	5	20	...	5	12	15	12	17	5	...	...	...	...	96	178	1,000	1,274
2. Gunnery and torpedo schools ...	3	3	3	12	...	...	9	...	3	7	3	4	...	...	...	44	83	462	589
3. Boys' training ships	5	1	5	12	...	...	10	...	5	11	5	...	...	...	...	49	100	653	802
4. Steam Reserves	3	3	4	10	...	3	5	28	7	10	7	24	46	46	163	356	112	322	790
5. Harbour tenders	...	...	No numbers taken.																
6. Drill ships...	9	...	6	3	...	...	9	...	9	9	...	...	...	...	...	36	42	222	300
7. Yachts, &c.	5	1	1	2	...	5	2	...	1	2	1	14	2	8	48	87	14	150	251
8. Dock and victualling yards ...	11	4	...	...	...	12	10	...	...	1	3	10	...	...	...	40	...	...	40
9. Hospital service	...	...	...	2	...	...	...	...	43	...	...	...	...	...	...	45	...	...	45
10. Recruiting...	...	...	...	4	...	...	4	...	...	...	...	...	...	...	...	8	...	...	8
11. Staffs of Flag Officers	8	...	...	8	...	...	...	...	...	14	...	...	...	...	...	22	...	8	30
12. Coast Guard on shore	...	...	30	35	...	...	...	...	...	11	...	...	...	...	...	76	...	No Nos. taken.	76
13. Stationary torpedo defence ...	...	...	No numbers taken.																
		17	54	108	...	25	61	43	80	92	24	52	48	54	211	859	529	2,817	4,205

be in sea-going and coast defence vessels; it would not be imperatively necessary that these civilians should enter under the Naval Discipline Act. Besides the Warrant Officers for Steam Reserve duty, extra ones for duty solely in the dockyards are included.

5. Harbour tenders. If necessary, all the naval men can be withdrawn from these vessels, and they can be commanded and manned by hired people. No complements are therefore taken for them in the scheme.

6. Drill ships. The complements of these will, as far as possible, be formed of retired Officers, Pensioners, &c.

7. Yachts. To these vessels will be assigned as many pensioners as it is proper to do.

8. Dockyards and victualling yards. Besides the naval Officers now employed in the dockyards each of the four principal yards will have four boatswains assigned to them, to assist in the dockyard work of ships fitting and refitting; they must not be withdrawn for other duties in the dockyard, or elsewhere, although they would be borne in the Steam Reserve ships. Such Officers were so employed until within the last few years, and they greatly facilitated the work, especially when the Officers of the ships fitting, &c., were strangers to the place. The Admirals Superintendent are mentioned in Chapter IV, and the Medical Officers are included under "Hospital Service" (see Section 9 of this chapter).

All naval Officers are agreed that for superintending the immediate supply of the needs of ships, no persons are so suitable as those who have practical experience as seamen. A few years back a great effort was made to have all this superintendence placed entirely in the hands of civilians; this attempt was ineffectual in the case of the dockyards, but it resulted in the removal of the Captains Superintendent of the victualling yards and hospitals. It was argued that the storekeeper was the proper person to take charge of a victualling yard. This arrangement appears to have worked well in a time of peace, but matters will be very different in a great war,—a naval Officer as Superintendent will then again be necessary. At Deptford the double duties of Superintendent and Master Attendant may be performed by one Officer, but at Portsmouth and Plymouth the Superintendents will, as formerly, be over both hospital and victualling yard. Without a naval Superintendent much extra work would be thrown on the Commander-in-Chief, as all difficulties would have to be referred directly to him; but with a Superintendent who thoroughly understood the whole question, and was in a position to command naval working parties, disputes and delays would be avoided. The Superintendent would be, in fact, a link between the civil control and the naval executive.

In time of war the work of provisioning a fleet is a most important matter, and great judgment must be used in the management and disposal of the lighters, &c. The supervision of the loading and despatch of the provisions must then be entrusted to a practical seaman of the navy, and therefore an Officer would be required in each yard as Master Attendant; he would also be responsible generally for the boats and vessels of the yard.

9. Hospital service. At the time of the abolition of the Captains Superintendent of Hospitals, &c., the supporters of that change contended that a hospital should be in the charge of a medical man; this argument is scarcely sustained by the custom of civil hospitals, but nevertheless there was no weighty objection to the alteration in time of peace when the duties of the hospitals could be performed comparatively at leisure. It was, however, evident to all thinking men that it would not answer with the pressure of a war near home, and that in such case some system similar to the old one must be established. Captains Superintendent, as formerly, will therefore be placed over the hospitals and victualling yards at Portsmouth and Plymouth. The posts of Lieutenants of the Hospitals will also be revived. It is to be remembered that in dealing with large numbers of patients there is much work wholly independent of their medical treatment, and that in connection with a large hospital in full activity there is a great amount of administrative work equally unconnected with surgery and medicine.

The work of receiving the clothes and effects of patients is an instance of duties requiring care and responsible supervision; this would come under the Lieutenant.

The number of Medical Officers given is what appears to be the present complements of the hospitals, but as several Officers are now, in peace, borne as additional, it is not likely that so small a number as that taken in this scheme would suffice.

In reviewing this question of the re-establishment of the control of a naval Officer over victualling yards and hospitals, let the case be considered when one of our fleets, having been a long time at sea, returns to our ports just after a severe engagement. The wounded must be landed, the vessels provisioned and coaled, stores supplied, men drafted, and all this with the utmost despatch. It is clear that administrative and not technical abilities will be required in the heads of departments, and the embarrassment which will be caused in any branch not having a naval head may be imagined.

The arrangements for landing the wounded would not be unimportant; lives might depend on the manner of conveyance of the patients, and on the avoidance of their detention anywhere between their ship and their bed in the hospital. It would be the duty of the Superintendent to determine these arrangements.

10. Recruiting. This duty is noticed in Chapter I.

11. Staff of Flag Officers. This section includes the retinues (in this case the coxswains only). The Flag Officers are three Commanders-in-Chief, one senior Officer, one Superintendent of Reserves, three Superintendents of Dockyards.

During war the Admirals Superintendent of Dockyards must have Flag Lieutenants; the want of such an aid is much felt even in peace.

12. Coast Guard on shore. If necessary the whole of the Officers and men now in the Coast Guard on shore and fit for active service would be withdrawn and sent afloat. Their places might be taken by retired Officers of the naval and military services, and Officers of the Royal Naval Reserve, and by old seamen, soldiers, policemen, and

others accustomed in some degree to discipline. The same number of persons as at present will be required in the force on shore, but no numbers are taken in the table except those of the inspecting Officers of divisions and the district Paymasters.

13. Stationary torpedo force. If not already established, on the outbreak of war a Coast Torpedo Defence Corps, under the Admiralty, must immediately be formed. It will be commanded by competent naval Officers, and will consist of two bodies—one movable, the other local. The movable body, or staff, will be for service on any part of the coast; the local body will not leave the special place to which it belongs, except in case of urgent need.

(*a*) The movable body will be composed of competent persons, naval, military, or civil.

(*b*) The local body will consist of watermen and competent persons unwilling to leave their own place of residence, also of the persons necessary to take permanent charge of the materiel.

Much training is of course necessary to teach the management of torpedoes, and *no one but thoroughly competent persons must be allowed to deal with them;* but there is a great deal of work (especially in boats) in connection with the handling of them which may easily be taught to boatmen and others. Were such a corps formed immediately on the outbreak of war much efficient work might be expected from them.

What may be called a technical torpedoist cannot be made quickly; therefore, as things stand at present, people having the requisite knowledge must be sought wherever and amongst whomsoever they can be found. This torpedo force is merely a temporary expedient for war occurring before a better arrangement is made (see Chapter VI); it should form a part of the Naval Coast Defence Corps spoken of hereafter (see Chapter IV, *q.* 2).

Division **E** *of Chapter I.—Stationary employments abroad* (*see Table V*).—1. Dockyards and shore establishments. As a rule the numbers of Officers for these establishments will, on the outbreak of war, remain as at present, but an addition in many cases is likely to be necessary later on. For some of the establishments, Officers in addition to those now borne are included in the table; to other establishments now under civil control, naval Officers are assigned. The Superintendents of dockyards who are also Captains of stationary ships are not included here.

2. Stationary receiving and store ships. Similarly to the case of the shore establishments, the numbers of persons for these vessels will remain generally as at present. The complements will be composed of sea-going Officers and men, with as large a proportion as is proper of natives of the locality and of other British subjects available.

3. Hospital ships. The personnel of these is included in Sections 2 and 4 of this chapter.

4. Hospitals. The number of Medical Officers taken in the table is that at present employed, except that one is added for Halifax and one for Trincomalee; more would be required in war. (See Chapter I, E. 4.)

TABLE V.

Division E of Chapter I.—Stationary Employments Abroad.

	Number of Vessels, &c.	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Lieutenants.	Navigating Officers.	Gunners and Boatswains.		Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total Officers and Steam Branch.	Marines.	Other Ratings.	Complements.
							Charge of Stores.	Quarter-deck Duty.				Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stokers.				
1. Dockyards, &c.	12	3	...	...	...	8	10	...	2	3	5	11	18	...	...	60	...	...	60
2. Receiving and store ships, &c. ...	9	4	4	9	...	3	15	...	5	11	3	1	7	5	18	85	113	593	791
3. Hospital ships	2	...	...	...	...	...	...	...	4	...	...	...	...	...	...	4	...	...	4
4. Hospitals	9	...	...	...	...	...	...	...	26	...	...	...	...	...	...	26	...	...	26
5. Vessels for harbour defence ...	6	...	1	2	...	...	4	...	...	2	...	6	6	10	36	67	35	48	150
6. Special services (not surveying)	...	...	...	...	...	...	2	...	...	1	...	4	...	...	...	7	...	...	7
7. Staffs of Flag Officers	3	...	...	3	...	...	...	...	...	6	...	...	...	...	...	9	...	21	30
		7	5	14	...	11	31	...	37	23	8	22	31	15	54	258	148	662	1,068

5. Vessels for harbour defence. A small standing force is assigned to these vessels; the necessary complements for service must be made up from the receiving ships. Natives might be made available. (See Chapter I, E. 5.)

6. Special services. The only numbers taken in the table are those of Officers at present employed on the following duties:—Charge of naval and victualling stores, 1; charge of torpedo stores, 1; charge of ordnance stores, 2; reventing guns, 3. A considerable increase under this heading, both as to duties and to persons, might be expected in war.

7. Staffs of Flag Officers. As already mentioned, this comprises the staffs, retinue, &c., of three Admirals Superintendent abroad.

The Abstracts of the numbers given in the Tables (see Table VI).—In the foregoing tables, the numbers shown of Officers available are 5 per cent. less than the actual numbers now on the list (see Chapter II, A), except in the case of Midshipmen, where only 2 per cent. are deducted. In Table VI, amongst the "Officers available" are set down eighteen Officers of the Royal Naval Reserve to be employed as Lieutenants. Of these, eight would be for special appointments; the other ten, as explained in Chapter IV (Division D, Section 2), whilst holding their proper rank and duty, would be considered as a relief to the Sub-Lieutenants' list, not to that of the Lieutenants.

In the column "Midshipmen," Naval Cadets are not taken into account in the number given as *required*, but the Cadets now afloat are included as Midshipmen *available*, as they might any day be rated. The forty Royal Naval Reserve Midshipmen cannot be considered a substitute for naval Midshipmen.

In addition to the employments mentioned in Chapter I, a few others will be noticed hereafter (see Chapter IV, *s*).

By the summary of numbers given in Table VI, it appears that for the force of materiel assumed the personnel falls short in Officers, that there is a great deficiency in the steam branch, and that, allowing for casualties, the seamen and marines are somewhat in excess of the immediate requirements. With regard to the Officers and the steam branch this is eminently unsatisfactory, nor can the very small expansive power left in the other branches be considered all that is necessary; it is imperative, therefore, to seek other means of extending the personnel. This will be dealt with in the next chapter.

Chapter IV.—Distribution of the Personnel.

Many classes of employment need not be confined to one rank of Officers; a superabundance on one list will therefore, to some extent, supply deficiencies in the list above or list below; this is especially the case with Flag Officers, Captains, and Commanders, and with Medical Officers. Officers of some standing in their rank are assumed to be available in that above them; thus, for example, it may be taken that a deficiency in the whole number of Flag Officers, Captains, Commanders, and Lieutenants might satisfactorily be made up with Sub-Lieutenants, were there sufficient Sub-Lieutenants to do so. As

TABLE VI.

ABSTRACT OF NUMBERS IN PRECEDING TABLES. FLAG OFFICERS NOT INCLUDED.

	Post-Captains.	Commanders.	Lieutenants.	Sub-Lieutenants and Navigating Sub-Lieutenants.	Navigating Officers.	Midshipmen.	Gunners and Boatswains.		Medical Officers.	Accountant Branch.	Carpenters.	Steam Branch.				Total.	Marines.	Other Ratings.	Complements.
							Charge of Stores.	Quarter-deck Duty.				Officers.	Engine-room Artificers, &c.	Leading Stokers.	Stokers.				
Division A, Table I	83	199	653	384	288	324	388	44	380	446	100	525	1130	1,208	5,348	11,500	7,747	31,626	50,943
,, B, ,, II	6	...	46	2	10	...	56	...	8	8	6	58	95	100	281	676	402	1,642	2,720
,, C, ,, III	12	6	67	6	17	...	17	50	18	31	11	57	68	90	386	836	395	1,560	2,791
,, D, ,, IV	17	54	108	...	25	...	61	43	80	82	24	82	48	54	211	859	529	2,817	4,205
,, E, ,, V	7	5	14	...	11	...	31	...	37	23	8	22	31	15	54	258	148	662	1,068
	125	264	888	392	351	324	553	137	523	590	149	714	1,372	1,467	6,280	14,129	9,221	38,307	61,727
							137												
							690												
Boys under training ...																			2,200
Personnel required ...																			63,927

OFFICERS AVAILABLE.

On the Active list	165	208	795	188	187	*318	677	345	470	182	636
On the Retired list	80	80	40	...	40	...	10	50	20	5	40
Royal Naval Reserve ...	...	...	*18	*10	60	*40	...	...	...	...	1
Temporary	...	...	...	...	20	...	...	20	20	...	25
	245	288	853	198	307	358	687	415	510	187	702
			*843	*208		*318					

ABSTRACT AS TO THE OFFICERS.

Required	125	264	888	392	351	324	690	523	590	149	714
Available	245	288	843	208	307	318	687	415	510	187	702
Surplus	120	24	...	...	...	...	...	...	...	38	...
Deficiency	...	...	45	184	44	6	3	108	80	...	12
				45							
				229							

* See explanation following the table.

AVAILABLE IN ALL GRADES.

Officers, seamen, and boys ...	44,850	
Marines	11,000	
Royal Naval Reserve	9,000	
Seamen and Marine Pensioners ...	2,000	
Royal Naval Artillery Volunteers	1,200	
Retired Officers (not Flag)... ...	365	
Temporary Officers...	85	
	68,500	
Deduct 2 per cent. on 40,000 for casualties	800	
Total available ...	67,700	67,700
Total required		63,927
Surplus		3,773

an actual matter of fact, when all the Sub-Lieutenants are absorbed by the Lieutenants' list, a deficiency will still remain. How this and similar wants are arranged for it is the business of this chapter to explain.

Naval Cadets and other young Officers must not be entered in increased numbers more than to supply the extra waste in war; they would be of little use for a considerable time, and would be a great embarrassment on the list afterwards. It is impossible to assign beforehand a person to each post, or a post to each person; but sufficient provision as to members being made, and the disposal of the bulk of the personnel being satisfactorily arranged, suitable employments for suitable persons would suggest themselves. The numbers given in Chapter III of Officers, &c., required for each of the various employments are not unusual, and may be considered rather to fall short of than to exceed what will actually be required. In considering the available force of Officers now on the active list, it is thought better to take the actual numbers in each rank as they are given in a recent Navy List, than to found a calculation on complements which are not closely adhered to. In each case not otherwise specially mentioned, a deduction of 5 per cent. is made from the numbers on the active list to allow for sickness and other casualties; this is probably a fair average, though it may be too small in the upper lists and too large in the lower ones.

It is not perhaps generally known that the Officers of the Royal Naval Reserve are not engaged under the same Act of Parliament as the men. The men are raised under an Act of 1859 for "the establishment of a Reserve Volunteer Force of Seamen," and this body is there named "the Royal Naval Volunteers." The Officers are entered under an Act of 1863, "to establish Officers of the Royal Naval Reserve." In Chapter II is given a list of all persons who may be made available; the general disposal of them will be explained here.

The subject of the distribution of the personnel is arranged in the following divisions:—

a. The employment of Flag Officers.
b. Employment of Post-Captains otherwise than in command of ships.
c. Providing Officers to command vessels.
d. Officers of the military branch, not in command, for sea-going ships, coast defence ships, and stationary ships abroad, viz.: Commanders, Lieutenants, Sub-Lieutenants, Navigating Officers, Warrant Officers, Subordinate Officers, Reserve and Temporary Officers.
e. Engineer Branch.
f. Medical Officers, &c.
g. Accountant Branch.
h. Chief and other carpenters.
j. Employment of Marine Force.
k. Standing force of Working Petty Officers, Seamen, and Boys.
l. Seamen and Marine Pensioners.

m. Seamen of the Royal Naval Reserve.
n. Royal Naval Artillery Volunteers.
o. Boys and Novices.
p. Other men entering voluntarily.
q. Men liable to compulsory service.
r. Manning the Fleet.
s. Employments and requirements not already mentioned.

a. The employment of Flag Officers.—The posts to be occupied are as follows:—

	Number.
At Home.	
Commanders-in-Chief	3
Senior Officer in Ireland	1
Superintendent of Reserves..	1
Superintendents of Dockyards	3
Channel Squadron.	
Senior Officer in command	1
Junior Flag Officers..	2
Captain of the Fleet..	1
Mediterranean.	
Commander-in-Chief	1
Junior Flag Officers..	3
Captain of the Fleet..	1
Superintendent Malta Dockyard	1
North America and West Indies.	
Commander-in-Chief	1
Superintendent Jamaica Dockyard	1
China.	
Commander-in-Chief	1
Junior Flag Officer	1
Superintendent Hong Kong Dockyard	1
East Indies.	
Commander-in-Chief	1
Junior Flag Officer	1
Pacific.	
Commander-in-Chief	1
Junior Flag Officer	1
Cape of Good Hope.	
Commander-in-Chief	1
South-East Coast of America.	
Commander-in-Chief	1
Australia.	
Commander-in-Chief	1
Detached Squadrons.	
Senior Officers in command	2
Junior Flag Officers..	2
Lords of the Admiralty	4
	38

It is not likely that a less number than that given above would suffice, but the arrangement of the Officers as to stations might be somewhat different according to circumstances.

Besides the above-mentioned posts it might be found necessary to make appointments for the following duties:—

1. Admiral Superintendent of transport service abroad or at port of landing of an expedition.
2. Admiral Superintendent of reserves and resources in Australasia.
3. Admiral Superintendent of reserves and resources in Canada.
4. Admiral Superintendent of Cape of Good Hope dockyard.

There are now 69 Officers on the active Flag list (see Division A, Chapter II); of these 80 per cent. may be counted on as ready for service; there are therefore at least 55 Officers to fill the 38 certain, or 42 possible, appointments named. This would leave a margin for other appointments, and to meet the difficulty which would be found in suitably employing the Officers of the three highest grades, viz.: Admiral of the Fleet, Admiral, and Vice-Admiral.

The Flag Officers on the retired lists who are likely to be available are estimated at fifty in number; this would be an ample supply for civil posts under the Admiralty.

The damage that an Officer's professional value suffers by retirement may be considered to be in the inverse ratio to the time he has served, so that really a Flag Officer of say ten years on shore has lost nothing, and is merely a little behind his time, whilst a young Lieutenant of perhaps two years on half-pay has to some extent to begin again. This is justly recognized in the established periods of non-service which compel retirement.

b. Employment of Post-Captains otherwise than in command of ships.—The whole number of Officers, in all ranks, available for command being small (see Division *c* of this chapter), Post-Captains will as much as possible be restricted to the command of ships. Flag Officers would be appointed to places now occupied by Post-Captains, and which might properly be held by Admirals. It would be easy to compensate Captains so displaced by giving them equivalent appointments at sea, as Commodore or otherwise, and no one can feel injured at being sent to meet the enemy.

For posts in England created for the war, and in which the employment of Captains would be preferable to that of Admirals, Captains may be taken from the retired lists. Eighty retired Post-Captains will probably be available for service (see Division B, Chapter II), and as few of these would be put in command of ships, an ample number will remain for all other employments.

c. Providing Officers to command vessels, &c.—The ranks of Officers for this duty are as follows:—1. Captains; 2. Commanders; 3. Lieutenants and Sub-Lieutenants; 4. Navigating Officers; 5. Chief and other gunners and boatswains.

1. *Captains.*—The numbers of the Captains are as follows:—

Available on the active list	165	165
„ „ retired list ..	80	
	245	
Required	125	125
Surplus ..	120	40

Independently, therefore, of the retired Officers, a considerable number of Captains will be available to assist the Commanders' list; this will be brought about by appointing Post-Captains to some of the best of the sloops, as is often done now, to some of the best of the merchant cruizers, and to other suitable places usually filled by Commanders.

2. *Commanders for command.*—The numbers of Commanders (for all duties) are as follows:—

Available on the active list	208
„ „ retired list	80
	288
Whole number required	264
Surplus	24

Out of the whole number required, 228 at least must be sea-going Officers; so taking the whole of the 208 Commanders counted as available on the active list to be fit for sea service, there will here be a deficiency of twenty. This deficiency will no doubt be met out of the retired list of Commanders and the active list of Captains. The remaining retired Commanders noted as available will supply the Coast Guard on shore, drill ships, &c.

3. *Lieutenants for command.*—The Commanders' list can give no assistance to that of the Lieutenants, nor can the Navigating Officers' list do so. A few appointments to command despatch vessels, &c., may be made from Officers of the Royal Naval Reserve, but the Lieutenants' commands for the most part must be supplied from the Lieutenants' list alone as a first charge on it.

4. *Navigating Officers for command.*—As is more fully explained hereafter (see Division *d*, 2 and 3), the Lieutenants', Navigating Officers', and Sub-Lieutenants' lists combined are insufficient to supply the number of Lieutenants and Navigating Officers required. To avoid, therefore, drawing more largely than at present on the Navigating Officers' list for Officers to command, a few of the vessels of the class usually commanded by Navigating Officers may be placed in charge of Officers of the Royal Naval Reserve.

5. *Chief and other Gunners and Boatswains for command.*—The number of Lieutenants, &c., being too small, it is necessary to assign gunners or boatswains for command of a certain number of the home coast defence gunboats and torpedo-boats. This arrangement must depend on competent Officers being available, otherwise it will be imperative to withdraw Lieutenants or Sub-Lieutenants from sea-service for this duty.

d. Officers of the military branch, not in command, for sea-going ships,

coast defence ships, &c.—The ranks of these Officers and the numbers now available on the lists (for all services) are as follows:—

1. Commanders		208
2. Lieutenants		795
3. Sub-Lieutenants		188
4. Navigating Officers		187
5. Chief and other Gunners and Boatswains		677
6. Midshipmen and Cadets		318
7. Officers Royal Naval Reserve } assumed		128
8. Temporary Officers } numbers		20

1. *Commanders (second in command).*—As already shown (see Division *c* of this chapter), the duties of Commanders can be provided for without drawing on the list of Lieutenants. It will not be necessary to restrict the employment of Commanders as second in command; they will continue to be appointed to all such vessels as usually bear them. Retired Commanders will not be considered available as executive Officers.

2 *and* 3. *Lieutenants, &c., and Navigating Officers.*—Before considering specially the numbers of these Officers it is desirable to take notice of the following points:—

Firstly. The reduction in numbers of the special navigating class and the substitution of Lieutenants for navigating duties have increased the complement of Lieutenants.

Secondly. The Lieutenants for navigating duties are available for ordinary Lieutenants' duties, and the navigation will be very efficiently performed by Officers of the Royal Naval Reserve, or by temporary Officers drawn from the Mercantile Marine, &c.

Thirdly. The training gone through by the Officers Royal Naval Reserve is not at all essential to the satisfactory fulfilment of a navigating Officer's duties, so that they could properly be undertaken by temporary Officers. It is worth while, in passing, to note this return to the old system, when masters of men-of-war were masters of merchant ships who had joined the navy.

2. *Lieutenants.*—The numbers with regard to the Lieutenants are as follows:—

Available on the active list, including Lieutenants for navigating duties	795
Available on the retired list	40
„ in Royal Naval Reserve	8
	843
Required	888
Deficiency	45

The whole of the Lieutenants, 795 in number, on the active list will be available for, and must be confined to, Lieutenants' duties, not navigating. As it is in reality impossible to provide, otherwise than from the Sub-Lieutenants' list, a ready-made and proper substitute for a Lieutenant, forty-five Sub-Lieutenants will be promoted to supply the above deficiency.

Eight only out of the eighteen Officers of the Royal Naval Reserve set down in Table VI as available for the duties of Lieutenants are counted here; they are the Officers previously mentioned (see Division C, Chapter II) as suitable to command vessels, Coast Guard stations, &c. The ten other Royal Naval Reserve Officers should not be appointed to ships *instead* of so many naval Lieutenants, but as "Additional Lieutenant in lieu of Sub-Lieutenant."

3. *Sub-Lieutenants.*—The numbers stand thus:—

Available on the active list	188
,, Lieutenants Royal Naval Reserve in lieu of Sub-Lieutenants	10[1]
Available Sub-Lieutenants Royal Naval Reserve ..	10
	208
To be promoted and so supply the deficiency of Lieutenants	45
	163
Required	392
Deficiency	229

This is a deficiency that ought not to exist without a remedy, and yet it is hard to see how it will be supplied. In large ships Sub-Lieutenants have usually duties to perform similar to those of the junior Officers, but in small vessels their duties are those of a Lieutenant. It has been already seen that there are no Lieutenants to spare, and further on it will be shown (see Section 6 of this division of the chapter) that there are no junior Officers available to help out the number of Sub-Lieutenants; Officers of the Mercantile Marine seem to be the only resource, but those estimated as likely to be forthcoming are already accounted for. In sum, this seems a serious defect in our present arrangements for war.

4. *Navigating Officers.*—The withdrawal of the Lieutenants for navigating duties from that special work reduces considerably the number of navigators, the only ones left being the Officers of the old navigating class.

The account is as follows:—

	Number.
Available Officers of the old navigating class on the active list	187
Available Officers of the old navigating class on the retired list	40
Available Officers of the Royal Naval Reserve ..	60
Available temporary Officers	20
	307
Required	351
Deficiency	44

This again is a serious deficiency, and whether it be considered as one in this list or in the Lieutenants' list the gravity of the case is not

[1] See preceding section (2), and also explanation to Table VI, Chap. III.

lessened. If the proper number of Officers is not forthcoming the efficiency of the ships will suffer; the number of requirements will not reduce itself, so against hope it must be hoped that many more Royal Naval Reserve and temporary Officers than is here calculated on will offer themselves.

5. *Chief and other Gunners and Boatswains.*—The numbers are as follows:—

Available on the active list	..	..	677
„ „ retired list	..	..	10
			687
Required in charge of stores	..	553	
„ for quarter-deck duty	..	137	
			690
Deficiency	..	..	3

In certain vessels, as troopships, &c., gunners or boatswains for quarter-deck duty are more suitable than subordinate Officers, but in all vessels to which Midshipmen are allowed, a deficiency of these young Officers could be well supplied by Warrant Officers if available. As seen above, there is a nominal deficiency of three, but in reality it would be much greater. The requirements assumed in this scheme as to the personnel are based upon the actual complements of ships, but in various employments large numbers of Warrant Officers are now borne as "additional," and it is not possible to see how they could be dispensed with except at a great sacrifice of efficiency, so that in fact many more than the present number will be required. The deficiency must be supplied by a moderate number of promotions from before the mast, by increasing the number of chief petty Officers in these branches, and by employing civilians in any harbour posts usually held by Warrant Officers, and for which suitable men could be found.

6. *Midshipmen.*—The numbers are as follows:—

Available on the list	..	..	318
Required	..	..	324
Deficiency	..	..	6

The available number 318 includes the Naval Cadets now on the list, although the number 324 required is according to the complements of Midshipmen only, so that, strictly speaking, the number of Naval Cadets, viz., 36, ought to be added to this deficiency of 6.

The number of Midshipmen now allowed to ships is very small; the complements, therefore, must not be permitted to fall short. The above deficiency would, when possible, be supplied from the Warrant Officers' lists. It will be observed that Midshipmen are allowed only to iron-clads and cruizers which are Post-Captains' commands.

Young Midshipmen of the Royal Naval Reserve would be of little use, and therefore they are not counted here; they could not learn their duty during a short war, and they would then be discharged again to their mercantile employ, the work spent on their instruction

in the navy being to a great extent labour lost. As a matter, however, of policy, the employment of one or two in each large ship (say forty in all) would tend to draw tighter the bonds now far too relaxed between the navy and the Mercantile Marine, and would be a proper recognition of the zeal and patriotism of the Royal Naval Reserve.

7. *Officers Royal Naval Reserve.*—A large proportion of the Lieutenants of the Royal Naval Reserve who appear on the list would not be suitable for employment as Lieutenants of men-of-war. Amongst them are old merchant Captains of great ability and of great experience as navigators and in handling ships; these Officers would be invaluable to command despatch vessels, store ships, &c., or to perform navigating duties; nothing but patriotism could induce such men to accept the posts open to them in the navy.

These Officers are divided and estimated at numbers as follows (see also Chapter II) :—

α To command vessels, &c. (see Division *c*, Sections 3 and 4 of this chapter)	8
β As Lieutenants	10
(These Officers will be distributed singly in large vessels. See Division *d*, Section 2.)	
γ As Sub-Lieutenants	10
δ As Navigating Officers	50
(These are Officers who are very good navigators, but from age and other reasons are not suitable for Lieutenants' duty.)	
Junior Officers (see Section 6 of this division of the chapter)	40
ζ Honorary Officers as Navigating Officers	10
(These will probably be retired Officers of the Mercantile Marine and gentlemen sailing their own yachts.)	

8. *Temporary Officers.*—These gentlemen (see Chapter II, D) will be employed almost exclusively as navigating Officers or in command of small tenders, &c., not strictly war-ships, and not manned and officered from the navy.

e. Engineer branch.—The Officers of this important branch are here considered in one group; the existing numbers in the different ranks are in due proportion, so that duties will be suitably assigned. The chief and other engine-room artificers are similarly grouped together.

In Chapter III is given a detailed account of the persons required.

The numbers of the Officers stand as follows:—

Available Engineer Officers of all ranks on the active list ..	636
„ „ „ „ „ retired list .	40
„ in Royal Naval Reserve	1
Temporary Officers, say	25
	702
Required	714
Deficiency	12

In reality, the deficiency would be much greater than twelve. Many of the numbers taken in the scheme, especially those for the Steam

Reserves, would probably be far short of the requirements, and there are other possible employments not mentioned. No account is taken of the steamers (tugs and others); not torpedo-boats, required for torpedo service. Credit is here taken for all the commissioned Engineer Officers, temporary or otherwise, likely to be obtained, so it will be necessary to supply further deficiencies by some other means.

It is likely that many engineers of the Mercantile Marine may be willing to serve in the navy, without. on the one hand, wishing to submit to the restraints, social and otherwise, and to the expenses of a Ward Room or Gun Room Officer's position, but who might decline to become engine-room artificers—in fact, to go before the mast; these should be entered as Engine Warrant Officers, and they might mess with the other Warrant Officers.

The next resource is a considerable increase in the force of engine-room artificers of both grades; but it is very questionable if it will be possible to obtain readily a sufficient number of persons who exactly possess the qualifications required of these men. It is probable that many useful engine-drivers might be engaged; this should be done, and if they were not qualified for the position of engine-room artificers they should be of the same rank but might be rated engine-drivers. They must in any case be suitable for taking charge of a watch in the engine-room.

It is desirable in future to engage as few as possible of temporary commissioned Engine Officers, and rather to enter engine-room artificers, engine-drivers, and temporary Engine Warrant Officers. It will be remembered that first-rate engineers are very highly paid in the merchant service, so that they are scarcely likely to leave it for the sake of joining the navy.

As to the leading stokers, it will be easy from amongst the present stokers to supply the increase required. Stokers of the 2nd class will be new entries.

It may therefore be taken that the principal deficiencies of the engineer branch will be in the numbers of fully qualified engine-room artificers and of stokers; it will be difficult to obtain enough suitable men, but they exist in the country, and their services must be got. As before observed, the relaxation of trade owing to the war will open fresh resources.

f. Medical Officers, &c.—In Chapter III it is seen that the numbers of Medical Officers required for the different employments are as follows:—

(A)	Sea-going fleets, &c.	380
(B)	Coast defence	8
(C)	Transport service	18
(D)	Home hospitals, stationary ships, &c. ..	80
(E)	Foreign „ „ „	37
		523

The whole complement of Fleet and other Surgeons is only 400, which is not sufficient for the sea-going ships alone, and unfortunately the complement is now fifty-two short.

The numbers as to the Medical Officers of all grades are as follows:—

Available on the active list	345
„ „ retired list	50
„ Temporary Officers, say	20
	415
Required	523
Deficiency	108

The resources from which to supply the deficiency have been already given in detail (see Chapter II, Division E, Section 2). Some difficulty may be anticipated in supplying the sea-going fleets, &c., but the country has a right to trust that patriotism and humanity will induce a sufficient number of medical men to offer their services.

g. Accountant branch.—The vast and increasing amount of correspondence and accounts, in all their branches, which is required in these days will make it necessary to keep the office staff of each ship, &c., very efficient as to numbers. In Chapter III it is seen that the numbers of Officers in the accountant branch required for the different employments are given as below:—

(A) Sea-going fleets, &c.	446
(B) Coast defence	8
(C) Transport service	31
(D) Home ships, &c.	82
(E) Stationary ships, &c., abroad	23
	590

The numbers as to the whole of the Officers in this branch stand as follows:—

Available on the active list	470
„ „ retired list	20
„ Temporary Officers, say	20
	510
Required	590
Deficiency	80

The most ready way of meeting this deficiency might seem to be to engage an additional number of petty Officer writers, but there are many objections to reducing much further the proportion of Officers in this branch. Whilst, therefore, entering a considerable number of writers, other means of supply must be looked to.

The resources are as follows:—

1. Employment of retired Officers of this branch and of other retired Officers (probably navigating Officers) who are competent for the work.
2. Employment of temporary Officers (see Chapter II, Division E, Section 3).
3. A slight increase on the present proportion of writers to Officers.

This, together with the writers who are merely to fill complement and not to take the place of Officers, will entail a large entry of these men.

The work of the temporary Officers must be assigned according to their qualifications and abilities. The Secretary's department of the staff of Flag Officers seems to be a direction in which suitable employment might easily be found. The office work would then be best performed as follows by the persons in the above sections:—

Accounts and ships' books, Section 1; correspondence, confidential copying, &c., Sections 2 and 3; ordinary routine writing and copying, by the newly entered writers.

h. Chief and other Carpenters.—The numbers are as follows:—

Available on the active list	182
„ „ retired list	5
	187
Required	149
Surplus	38

No Carpenters are assigned in this scheme to the merchant cruizers; they will be large iron vessels, with watertight compartments, and if it were decided that, say, one-half of them ought to have these Officers, the surplus would be immediately turned into a deficiency. It would be most difficult to supply a deficiency of these Officers. Carpenters' mates are the only possible substitute in sea-going ships.

j. Employment of the Marine Force.—The marines of both arms are most valuable as a reserve force for manning the fleet; it is the reason of the existence of the corps; they are not therefore, as has been already remarked, available as a part of the army. The high training of the rank and file makes it possible to employ a greater proportion of them in the complements of most of the large ships than at present; this would be especially the case in mastless ships where the number of seamen would be reduced in a corresponding degree. This arrangement is only intended to supersede the present one in case of the supply of seamen falling short.

The spare Officers not required afloat will be available for various duties connected with the navy, such as recruiting, training (other than in seamanship), stationary torpedo defence, &c. Selected Officers would perform even more essentially naval duties than these, such as Transport Officer, &c.

In case of emergency, the privates R.M.L.I. employed on board ship as Officers' servants might be withdrawn from those duties, and civilian servants entered instead.

The numbers of the corps stand as follows:—

Whole force voted	12,400
Available afloat	11,000
Required	9,221
Surplus	1,779

k. Standing Force of Working Petty Officers, Seamen, and Boys.—These will be disposed of as far as possible in the following manner:—

1. The Steam Reserves should require none.

2. Guard, training, and school ships will have as small a number as is consistent with the proper carrying out of the training, &c. It will be observed that much of this work could be performed by pensioners.

3. The transport service and coast defence vessels will similarly have as small a number as possible.

4. The remainder of this force will be divided amongst all the ships in commission or to be commissioned, keeping in reserve a proper proportion for vessels expected shortly to be ready, and for other emergencies.

This arrangement will give in each ship a substantial nucleus, and round it the crew would be completed from the other classes mentioned hereafter (see Division *r* of this chapter).

Ships without masts will require a smaller proportion of able seamen than masted vessels, the men of the other classes being increased accordingly.

l. Seamen and Marine Pensioners.—These men will be available for forming part of the crews of coast defence and home service vessels of all sorts; also in the Transport Service, Coast Guard, and Stationary Torpedo Defence Corps. Those who were instructors whilst in active service will probably be very useful in drilling and training at home. They will not be sent into sea-going ships other than those above mentioned unless they volunteer, or unless their services cannot be dispensed with in them.

Pensioners not fit for sea service might be usefully employed in the dockyards and steam reserves; the seamen as riggers, the artificers in their trades, and the stokers for work in ships fitting and refitting.

m. Seamen of the Royal Naval Reserve.—These men would all be sent into sea-going vessels, being distributed evenly in proportion to the complements; but the able seamen should be sent to masted rather than to mastless ships. In active service in sea-going vessels they would become men-of-war's men sooner than in home and coast employments.

n. Royal Naval Artillery Volunteers.—This corps would be employed generally in small coast defence vessels, such as gunboats. It would, however, be available for the larger coast defence ships, and, if necessary, for the home torpedo-boats. It might also form a part of the Stationary Torpedo Defence Corps (see Chapter III, D. 13).

o. Boys and Novices.—The Admiralty can at all times obtain as many boys as it requires. In case of necessity, a large number of first-class boys who had undergone a reduced period of instruction in the training ships would be available; their places could be immediately filled up. It is a great question if boys thus discharged directly to sea-going ships would not become much more useful men than those who have spent an interval of months in home receiving ships (forgetting all they had learnt) before going to sea. The experience of the entry of "novices" during the Crimean war was so satisfactory that the system might be re-introduced with great advantage. These novices were

lads too old to enter as boys; they were trained in a special vessel, and many fine seamen came from amongst them. Being entered during war their training would be short; but if they went through a course of, say, three months' duration they would become accustomed to life on board ship—*i.e.*, would understand their messing, clothing, and other arrangements, and they would be able to acquire some knowledge of practical gunnery and small-arm drills. As to pure seamanship, the greater part of that they must be left to acquire later; it would be sufficient to teach them to go aloft.

The coast defence ships would be a capital training school for breaking in new hands; novices might with advantage pass through them, when convenient, before going abroad.

p. Other men entering voluntarily.—On a declaration of war recruits become more plentiful, and there is little doubt, if a difficulty were experienced in obtaining men for service afloat in seamen's ratings, that the offer of a bounty would bring people in. There are the alternatives, either of offering a bounty, and so obtaining a moderate number of suitable men and many of an indifferent sort, or of compelling service, and thus of getting seafaring people alone; for service abroad the former course seems preferable.

The volunteers will be as follows:—

1. Seafaring men. These will be to fill ratings of able and ordinary seamen.

2. Civilian servants. In addition to the present ratings held by domestics afloat, men would, if necessary, be entered as Ward Room Officers' servants, so as to release the private marines for their proper duties. In action ample work is found below in the magazines, &c., or as powder men, for all the domestics, without their being required to handle rifle or cutlass, and it is therefore entirely wrong to consider them as an ineffective part of the navy. Handing powder and working a shell whip is never a proper employment for highly trained men. With marine servants in war-time, either the Officers or the men are put in a false position; the Officers must have servants, and the marines whilst doing that duty are not in justice available for service on shore.

3. Men for artificers and all other ratings for which persons have not been already mentioned, and which can be filled by new entries. It will not be easy to fill the artificers' places: the supply of suitable men depends on the system established to that end; any defect in that system can only by the payment of very high wages be rectified in a hurry.

4. Landsmen ready to engage as second-class ordinary seamen. These being men too old for entry as novices will only be engaged on an emergency. It would be very desirable, if possible, to give them a short preliminary training as in the case of novices, although the former will be older men.

5. Natives of Colonies, &c. These will be Negroes, Malays, Lascars, Eurasians, Chinese, &c., for sun working parties, servants, artificers &c. (see Chapter V).

Non-continuous service seamen could not now be expected to engage

for lower pay than the continuous service men; they would probably require a higher rate, but then they could be discharged absolutely, without breach of faith, at the end of the war.

q. Men liable to compulsory service.—1. Men who do not engage voluntarily, but who are liable by special enactment to serve in the navy.

a. By the Act of Parliament of 1853, establishing the Naval Coast Volunteers, it is declared that whenever any emergency shall arise which in the opinion of the Lord High Admiral, or of the Commissioners for performing that office, renders it advisable, they may require the Officers and men of the Coast Guard and of Her Majesty's revenue cruizers and seamen-riggers employed under the Crown, to join Her Majesty's navy, to form part of the crews of ships.

It is probable that all these persons now are a part of the navy, or pensioners from it; but it is not likely that the seamen-riggers could in any case be spared.

β. By the same Act it is provided that in case of danger of invasion all the out-door Officers and boatmen of the Customs, and all or any other seafaring Officers and men holding appointments under the Crown, and in active service, may be required by the Admiralty to join the navy and form part of the crews of ships.

Danger of invasion will of course exist in any great war, but except in an unprecedented emergency these persons could not be spared from their ordinary duty, so that they would be almost the last force called into service.

2. All seafaring persons not already mentioned. As it has been before observed, all the seafaring population are bound to defend the country by sea when necessary; it is unlikely that compulsory service on the high seas would be required, but it will be necessary to form a fresh reserve for coast and harbour defence when the first reserves have gone forward to active service. For this purpose a Naval Coast Defence Corps, as a sea militia force, compulsorily formed, ought to exist at all times; but in case of a great war occurring, not a moment must be lost in organizing some such body. This corps when formed would embrace the "Stationary Torpedo Force," which is still more necessary (see Chapter III).

Compulsory service, when called for suddenly, must be enforced very judiciously, so as in no way to embarrass trade at sea, and on no account by taking their crews to cause delays to our merchant ships in proceeding to sea.

If before requiring voluntary service a bounty were offered, and afterwards it became necessary to compel attendance, the pressed men should be allowed no claim to bounty, and should be entirely ineligible in any case to receive it until the declaration of peace.

r. Manning the Fleet.—The crews of the ships, exclusive of Officers and the steam branch, may be drawn from the following sources:—

1. Standing force of petty Officers, seamen, and boys.
2. Marine force.
3. Seamen and marine pensioners.

lads too old to enter as boys; they were trained in a special vessel, and many fine seamen came from amongst them. Being entered during war their training would be short; but if they went through a course of, say, three months' duration they would become accustomed to life on board ship—*i.e.*, would understand their messing, clothing, and other arrangements, and they would be able to acquire some knowledge of practical gunnery and small-arm drills. As to pure seamanship, the greater part of that they must be left to acquire later; it would be sufficient to teach them to go aloft.

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1. Standing force of petty Officers, seamen, and boys.
2. Marine force.
3. Seamen and marine pensioners.

4. Royal Naval Reserve.
5. Royal Naval Artillery Volunteers.
6. Novices and boys.
7. Voluntary new entries (seamen and landsmen).
8. All the seafaring population.

The complements, then, exclusive of Officers, &c., would as far as possible be composed in the following way of some or all of the classes mentioned above:—

Sea-going ships not hereinafter mentioned and stationary ships abroad:—Petty Officers, seamen, and boys; marines as per complement; additional marines in lieu of seamen; Royal Naval Reserve; novices and new boys; voluntary new entries (seamen, &c.).

Coast defence vessels:—Petty Officers, seamen, and boys; marines; seamen and marine pensioners; Royal Naval Artillery Volunteers; novices; voluntary new entries; compulsory service men.

Transport service:—Petty Officers, seamen, and boys; marines; seamen pensioners; voluntary new entries (seamen only).

Stationary ships at home:—(*a*) Guard, training, and school ships: petty Officers and seamen, as instructors; marines; pensioners; new entries, passing through. (*β*) Steam Reserve ships: marines; pensioners; new entries, artificers and stokers only: besides steam branch.

The mode of distributing in the ships the various classes of men for the different employments is given under the special notice of each class. Next to the working petty Officers and seamen, the most valuable component of the crew will unquestionably be the marines. The pensioners will be very useful if not too old or infirm. The Royal Naval Reserve men may be expected to shake down very soon to their new duties. The Royal Naval Artillery Volunteers are not likely to be required in vessels not usually in harbour. It will be important in the case of all the new entries to have each class of them distributed as widely as possible throughout the whole fleet, so that there may not be too many men of each body of them in one ship. Care must also be taken to avoid putting a large proportion of new hands into small vessels, unless experienced men have been selected for the remainder of the crew. The extra number of ships' police required must be made up from the marines; if the men selected for this purpose are not rated ships' corporals they should be given a distinct position and rank, such as that of marine corporal, with the corresponding pay. Lance-corporals R.M., with the pay of privates, are a very unsatisfactory sort of police.

It may be thought that landsmen would be of no use in the place of seamen, but it must be remembered that only a few years ago they frequently formed a large part of new crews. The experience of the old war shows how crews mainly of landsmen could fight their ships immediately on putting to sea, and in those days it was necessary to sail the ships as well as to fight them. Landsmen are *not* the best substitute for men-of-war's men, but they *are* a workable material.

s. Employments and requirements not already mentioned.—Besides

the employments which have been enumerated, there are several others depending more or less on circumstances, and for which, therefore, it was not advisable to assign a personnel in this scheme.

There are now in the following occupations the numbers of Officers given:—

At the Admiralty, Special Coast Guard appointments, Hydrographical Office, at Greenwich and Engineers' Colleges, for torpedo work at home, for floating factories, for various duties.	3 Captains, 2 Commanders, 9 Navigating Officers, 25 Engineer Officers, 2 Accountant Officers, 1 Chief Gunner, 3 Warrant Officers.

Many of these Officers will no doubt have to be retained in their posts, but as in some cases the work might be discontinued the number is not taken amongst the absolute requirements.

There are also at present a number of Officers borne for service as follows:—

Additional Lieutenants	In Gunnery and Torpedo Tenders.
Additional Engineers and Warrant Officers	In Steam Reserves and in Guard-ships.
Additional Medical Officers ..	In the Naval Hospitals.
Additional Accountant Officers ..	In home ships.
&c., &c., &c.	

How far these permanently additional Officers could be dispensed with in war-time is a question; war is not a time when work slackens.

No account of the following employments has been taken in this scheme; they might or might not exist in war:—Torpedo-boats abroad with independent crews; surveying ships beyond the number of two, and surveying Officers; training brigs; Coast Guard cruizers; stokers in harbour launches: also naval attachés and other civil employments under the Admiralty.

Chapter V.—Colonial Resources as to Personnel.

Though last in order these are not least in importance. The question of defending the empire, and with that object of the consolidating of the whole of its forces, is daily pressing itself more on public notice, and is of ever-increasing moment. The relative positions of the dependencies and of the mother country have undergone greater changes during the present generation than at any previous time; the colonies are no longer in the condition of children wholly dependent for protection on their parents, but are now, so to say, reaching manhood, and are ready, either in close union with the parent State, to defend the common interest, or, whilst withdrawing entirely from the paternal control, to remain in close bonds of union and friendship. What the connection is ultimately to be it is for statesmen to decide, but it seems certain that if the United Kingdom is itself to continue to exist in vigour, and not to retire into declining old age—content to see its glories continued in its offspring—consolidation or confederation, and not separation, will be the object of its policy.

Until steps are taken to organize its entire forces in one comprehensive scheme the defence of the different parts of the empire will be conducted in a wasteful manner, from the points of view of men, of money, or of materiel. In the absence of such organization, this loss being inevitable, it is necessary to accept existing facts, and to examine, as far as possible, what are the resources in the present state of affairs.

As yet no public estimate has been made of the whole seafaring (including fishing) population of the colonies and dependencies of the empire, but it is evident that it contains a large number of men who might be made available. The volunteers for general service in the Royal Navy might be few in number, but the seafaring inhabitants of the colonies, &c., would be most useful in vessels of the local governments and for local defence.

In a great war the colonies, &c., will not be satisfied with their few local government ships as at present; before the squadrons of the Royal Navy could be sufficiently augmented and posted, "Alabamas" of the enemy would be watching the approaches to the mercantile centres abroad, and the local governments would no doubt, to the utmost of their power, immediately equip and despatch cruizers to defend the commerce. These cruizers would continue to be a valuable auxiliary to the imperial forces.

It cannot be too often repeated that a large navy is for Great Britain a necessary and an economical insurance on her immense commercial wealth, and that the stoppage or delaying of her commerce would be far more costly than many ships-of-war. The hesitation of this country to provide a proper fleet of cruizers is the false economy of the householder who will not insure a valuable dwelling.

At the present time it is not possible to state with precision the capabilities of the several colonies, &c., to contribute men to the defensive forces of the empire; a personal acquaintance with each place and its circumstances would be necessary in order to form a correct judgment. This question, having been carefully investigated by local committees, is now under the consideration of the Imperial Government; there is no doubt that a most valuable collection of information has been made, and that sound and sure steps are now possible to bring about the consolidation of the forces of the whole empire. Whilst, however, waiting for the conclusions which may be founded on the information just obtained, provision must be made for possible immediate necessities; the statistics which follow will aid in forming an idea as to what the colonies, &c., can afford both in men and in money.

The circumstances of the various colonies, &c., differ so much that some small places can contribute directly to the imperial forces, whilst larger and richer settlements can provide only their own defence. As at present, the Colonial Naval Reserves of men are confined to two or three colonies; the bulk of the seamen of the Mercantile Marines of all parts of the empire will only be available as entirely new entries for the navy.

The colonial merchant shipping being so extensive, reserve men will no doubt be some day drawn from all parts of it. Colonial

merchant seamen will probably in the first instance be employed to man commissioned merchant cruizers: it will be best to employ them as far as possible on their own coasts.

In order to have a proper coast and harbour defence force always ready, it is highly desirable that this should be a compulsory service throughout the empire. Were the precedent established in the United Kingdom the colonies would no doubt prepare themselves to co-operate loyally. The coast and harbour defence spoken of in this chapter refers exclusively to the men for service afloat, whether in coast defence ships, gunboats, or torpedo-boats. The defence of the coast will in many cases involve the employment of cruizers. Unless specially mentioned, the coloured and native peoples not of European blood will here be considered as available for the auxiliary labour rather than for the actual fighting.

The colonies, dependencies, &c., may either singly or in groups be collected under the following headings:—

A. Those which can provide men for coast and harbour defence afloat and for service in the fleet.

B. Those which can provide men only for coast and harbour defence afloat.

C. Those which can provide very few men or none at all.

The financial power of each place cannot here be entered into.

A. *See Table* I, p. 170.

1. India should supply the whole of its Coast and Harbour Defence Corps; it cannot provide Europeans for service at sea, but Lascars may, if necessary, be employed to a small extent in the crews of despatch vessels, &c. Eurasians are available for domestics.

2 and 3. New South Wales and Victoria have each a Naval Reserve Force already formed. In addition to the Coast and Harbour Defence Corps which they now have, they will probably be able to man and maintain a few merchant steamers, commissioned as coast cruizers, to protect the approaches to their ports, and they will also supply reserve men and seamen as fresh entries for the navy.

4. Newfoundland should, from amongst its seafaring and fishing population, be able to form its own Coast and Harbour Defence Corps, and to supply men for the navy.

5. Hong Kong has no Europeans available, but will be able to supply an important contingent of Chinese. There is reason to believe that the Chinese are not at all deficient in courage, and that they will fight well when properly instructed and led. These may either be drilled to aid in the defence of the coast of the island, or they will supplement the European force in British men-of-war. It is generally considered that they are not able to perform as much work as an Englishman, but they are very useful in most of the employments for which landsmen are entered at home. Thus, plenty of servants, stokers, carpenters, sailmakers, painters, coopers, &c., are always ready to serve in the navy.

It is a question for consideration hereafter whether British-born Chinese may not be employed to a greater extent than at present as artificers in the fleet.

A. The Colonies, &c., which can provide men for coast and harbour defence afloat and for service in the Fleet. This division is composed as follows:—

TABLE I.

Dependency, Colony, &c.	Ordinary Revenue.	Area in square miles.	Revenue per head of population.	Population per square mile.	Population.				Remarks.
					British and whites.	Half castes and others.	Indigenous.	Total.	
	£		£						
1. British India	60,000,000	870,379	0·3	211·0	..	..	179,588,000	190,000,000	
2. New South Wales ..	4,904,230	310,937	7·0	2·4	..	..	..	750,000	
3. Victoria	4,621,282	87,893	5 3	9·8	..	..	..	858,582	
4. Newfoundland ..	205,231	40,200	1·2	4·0	..	..	..	161,389	
5. Hong Kong	200,822	32	1·4	4,348·0	7,525	1,451	130,168*	139,144	*40,000 British-born Chinese.
6. Malta	183,794	115	1·1	1,340·0	1,346	1,220	151,632	154,198	
7. Gold Coast Colony ..	88,980	16,620	0·16	31·0	..	..	..	520,000	
8. Sierra Leone	72,256	468	1·9	79·0	129	..	36,960	37,089	
9. Lagos	54,908	..	0·9	..	94	..	60,127	60,221	
10. Gambia	24,553	21	1·7	673·0	105	..	14,045	14,150	

B. The Colonies, &c., which can only provide men for coast and harbour defence afloat.

This division is composed as follows:—

TABLE II.

Dependency, Colony, &c.	Ordinary Revenue.	Area in square miles.	Revenue per head of population.	Population per square mile.	Population.				Remarks.
					British and whites.	Half castes and others.	Indigenous.	Total.	
	£		£						
1. Dominion of Canada ..	6,105,210	3,580,310	1·4	1·1	..	..	..	4,350,000	
2. Cape Colony	2,522,027	240,110	2·0	5·0	250,426	131,115*	522,497	904,038	*Malays 10,717.
3. Natal	473,478	18,750	1·3	20·0	24,654	16,999	319,934	361,587	
4. New Zealand	3,283,396	106,260	7·0	4·0	463,729	..	42,819	506,548	
5. South Australia ..	2,010,682	904,133	7·2	0·3	..	..	..	279,865	
6. Queensland	1,612,314	669,520	7·1	0·3	..	..	..	226,077	
7. Western Australia ..	180,849	975,824	6·0	0·03	..	..	..	30,200	
8. Tasmania	439,779	26,215	3·8	4·0	..	..	None	115,705	
9. Ceylon	1,474,867	24,702	0·5	111·0	..	..	..	2,758,166	
10. West India Islands mean statistics	1,348,392	13,750	1·0	91·0	..	..	..	1,250,000	
11. Guiana..	404,461	85,000	1·6	3·0	..	..	..	252,000	
12. The Bahamas	42,945	5,794	0·9	7·5	..	..	..	43,521	
13. Mauritius	793,769	350	2·1	1,028·0	..	244,397*	..	359,988	*Indians.
14. Straits Settlements ..	472,260	1,440	1·6	243·0	..	..	..	350,000	
15. St. Helena	11,950	47	2·4	107·0	..	..	..	5,059	

6. The general population of Malta is large, and there are many seafaring people; it ought to provide its own Coast and Harbour Defence Force and also supply a Naval Reserve Force. It will supply domestics as well.

7, 8, 9, and 10. Gold Coast Colony, Sierra Leone, Lagos, and Gambia can supply no Europeans; the black populations will, however, provide as many men as it would be proper to employ, either in local defence or for sea service. The coast and harbour defence would require organizing and directing by a few of the imperial forces.

B. *See Table* II, p. 45.

1. The Dominion of Canada has an extensive Mercantile Marine, besides a large fishing population. It can provide its own Coast and Harbour Defence Force, including coast cruizers; but as the approaches to be defended are extensive and important a supply of men to the navy cannot be depended on.

2 to 8, inclusive. These colonies, for the most part, are thinly populated, and the indigenous races are not to be counted on for service afloat; but each colony should provide Europeans for its coast and harbour defence. The places adjacent to one another may possibly combine to some extent, especially with regard to the coast cruizers.

9. Ceylon has a large indigenous population, of which many men may be employed for its coast and harbour defence; but there will not be Europeans available, nor will it be able to man coast cruizers.

10 to 12, inclusive. West India Islands, Guiana, and the Bahamas. The Europeans here are few in number, so that it will be necessary to draw the defence forces almost entirely from the coloured people; of these there will be available as many as it is proper to employ. As these places will therefore not be able to provide entirely their coast and harbour defence much assistance must be given by imperial forces, and on them the organization will depend.

13 and 15. In both Mauritius and St. Helena the coast and harbour defence required will be very moderate in proportion to their populations, and no cruizers will be required; they should therefore provide the force necessary.

14. The Straits Settlements have very few Europeans available, but the Malay population contains a large number of seafaring persons. It would be difficult to properly man coast cruizers other than a gunboat or two.

C. The colonies, &c., which can provide very few men or none at all for their defence are as follows:—Cyprus, Gibraltar, the Bermudas, Honduras, Heligoland, Falkland Islands, Labuan, Fiji Islands, Ascension.

At the present time, very few of the natives of any of the extensive dependencies of the United Kingdom have been organized or drilled with a view to defence afloat. Something akin to it has, however, been begun by the employment of small numbers of them to aid in torpedo work.

In mentioning, in this chapter, the people who may be counted on in the different places for various services, it has not at all been intended to convey the idea that there is now any sort of preparation

for making use of these men; the simple fact is pointed out that a certain amount of raw material exists, and that with suitable arrangements it may be turned to good account.

Chapter VI.—Suggestions for Amending in certain points the Arrangements as to the Standing Personnel of the Navy, &c.

Hitherto this essay has dealt solely with the question of the naval forces and reserves as they now are, or as it may be expected that they would be arranged immediately on the approach of a great war, without any material change of system. When war is impending, it is no time to think of altering the internal dispositions of the fighting services; but at a time when it may be hoped that peace will not soon be broken, a great nation is very ill-advised which does not do its best to establish everything on the best footing for developing the power of the country.

It is unlikely that a war between great nations would last over six months, and this will give no time for correcting a faulty organization. The whole question of future alterations cannot be gone into here, but it is proposed to notice briefly a few of the points which appear to merit immediate attention, and therefore not to be foreign to the argument of the essay. The subject of this chapter is divided under the following headings:—

A. Officers and others on the Active List.
B. Marine Force.
C. Petty Officers, seamen, &c.
D. Retired Officers as a reserve.
E. Reserve of naval seamen.
F. Pensioners.
G. Coast Defence Corps.
H. Royal Naval Reserve in the Colonies, &c.
J. Disposal of seamen, &c., on termination of war.

A. *Officers and others on the Active List:—*

1. Flag Officers, Captains, Commanders, and Lieutenants.
2. Sub-Lieutenants, Warrant Officers, and Midshipmen.
3. Various classes of Officers and extension of the Warrant Officer system.

1. *Flag Officers, Captains, Commanders, and Lieutenants.*—The lists of Flag Officers and Captains appear to be sufficiently large for practical purposes. The Commanders' list shows a deficiency of about fifty-six, and although this can at the present time be made up by retired Officers, it is questionable whether so many of these latter will be available in a few years' time. The complement of the Commanders' list should be increased by twenty-five at least. It is difficult to see any objection to this step; more Officers would have to retire in this rank, but the increased advancement to the Lieutenants would compensate for that result. Commanders would then have more half-pay time, but this extra period properly employed will raise and not lower the standard of the Officer. No doubt the time of Officers on half-pay is often grievously wasted, but this is the direct result of the system

which keeps them in complete uncertainty as to how long it will be before they are again called into service. A Commander after promotion may be employed in a few days, or he may be daily, for three years, expecting an appointment; independently of family and other ties, few men can summon resolution enough in such circumstances to undertake any serious study.

With Post-Captains the prospect of non-employment for a particular period is almost a certainty; but if habits of application have not been cultivated before attaining that rank, or, rather, if habits of uncertainty have been encouraged, it is not likely that serious work will then be undertaken.

Of Commanders and Lieutenants each rank should be divided into two rosters—employment and non-employment; the former would be filled, ordinarily, by names moving up in succession from the latter. All Officers on being promoted would go into the non-employment list, and an Officer might be moved from the employment to the non-employment list, and to any part of it, at his own request, and with the permission of the Admiralty. On an Officer coming on half-pay, the *roster* and *position* on it should be decided by the Admiralty. Unless there was reason to the contrary, to be judged of by the Admiralty, Officers should be taken from the top of the employment list when required for service, and all selections made by Officers in command, &c., should be rigidly from the employment list; this would not apply to Flag Lieutenants. Of course the suitability or otherwise of Officers for appointments would not be overlooked. It would not be at all necessary that these rosters should be published; it would be sufficient to know that the system was, *bonâ fide*, carried into effect, and that an Officer should always be able to ascertain his own position on the list. The official of the Admiralty attending to this matter would then be able to give any one a very good idea of the time he was certain or likely to remain unemployed. It is evident that whilst the Officers would gain much in greater certainty as to their own movements, the Admiralty would remain free, as they could, on an Officer's return to half-pay, place him in a position to be employed after the lapse of any interval they might please, only he would be aware of the decision. The employment list also would be large enough to allow the necessary power of selection. An Officer might be moved downwards on the list at any time if the Admiralty thought fit, but he should be informed of the alteration.

2. *Sub-Lieutenants, Warrant Officers, and Midshipmen.*—On going to war, the deficiency which will occur in the number of Sub-Lieutenants will be a great evil. Of late years the discipline of ships has suffered from want of junior Officers; where formerly there were numbers of Midshipmen there are now few or none. It is probable that ere long they will be entered at a higher age than at present, and this may involve other changes, but in the meantime the mischief goes on. In nothing larger than a gun vessel should it ever be necessary to leave the deck in charge of a 1st Class Petty Officer only, but this now frequently cannot be avoided. The remedy is to increase considerably the number of Warrant Officers in the military branch, and to employ

them in boat duty, quarter-deck watch, &c., precisely as Midshipmen. Warrant Officers not being taken from their duties to receive instruction would have a great value over Midshipmen, and if care were taken with the former, on their first appointment after promotion, to properly teach them their duty, a satisfactory result cannot be doubted of. These Warrant Officers, as far as their number went, would compensate for the deficiency of Sub-Lieutenants as well as of Midshipmen. The actual want of junior Officers now makes it necessary to employ Lieutenants on many duties which formerly belonged entirely to Midshipmen; this is not a desirable thing, either as regards the Lieutenants or the execution of the service. There are many small duties away from the ship which could not be performed by a petty Officer, however trustworthy he might be.

3. *Various classes of Officers and extension of the Warrant Officer system.*—The general class of Officers in certain positions in the service is now different to what it was years ago, and the change has no doubt been the source of some of the difficulties with regard to rank, &c. It is found that for the work of the junior ranks in all branches, Officers have been entered to an extent far beyond what it is possible to provide promotion for them to the higher ranks. The result is a natural return to the system of obtaining a certain number of persons of a lower position. In the steam branch this is done by substituting artificers for Officers; in the accountant branch by substituting writers for Officers. For the navigating branch the remedy has been total abolition. In the military branch an incomplete step, that of merely reducing entries, has been taken. In the medical branch, similarly, an incomplete step, by reducing the number of Medical Officers in ships, has been taken. The marines are in an uncertain state.

In all these cases the remedy is in principle the same, viz., a considerable extension of the Warrant Officer and superior Petty Officer system.

The need for more Warrant Officers in the military branch has been already noticed. The present superior Petty Officers of the steam branch ought to be Warrant Officers; the importance of their duties requires it.

In the medical branch some change is evidently necessary; it is a serious matter to think of large corvettes, of 230 men and over, having only one man on board who can administer simple medicines, make up a prescription, or properly attend simple wounds, &c. In vessels of any size with only one qualified medical practitioner, there should be other persons having considerable experience in handling wounds and in dispensing medicines. A knowledge of dentistry is not unimportant. A higher rank, position, and title than that of "sick berth steward" is required; "Dispenser" appears a suitable name. The present qualifications required of a sick berth steward are, that he "must be able to read and write, and possess a fair knowledge of keeping accounts;" he may have not the smallest knowledge of drugs, and have never been near a case of injury or of the least sickness.

B. *Marine Force.*

1. Duties of the Officers.

2. Employment of Marine Artillery.
3. Marines afloat in time of peace.

1. *Duties of the Officers.*—Such a corps as the marines deserves to have its Officers made of more use in the navy than is now the case. The Officers are in a false position on board ship; occasionally they are employed, but generally they have nothing of the least importance to do. It is much to be desired that this should be changed; the marine Officer should, in all cases where he is competent to take charge of the work in hand, take command according to his relative rank. Thus a mixed party on shore of seamen and marines should be commanded jointly by the senior Officer present.

Marine Officers should assist in all the gunnery drills, &c., of the ship; they should be led to look on themselves as naval Officers in red coats, and not as soldiers who are mistakenly put on board ship.

2. *Employment of Marine Artillery.*—The Marine Artillery occupy an uncertain position; the present way in which they are employed seems throwing away such a fine and highly trained body of men. To many people it appears that to the Marine Artillery, in conjunction with the navy, should be assigned the work now performed by the Royal Engineers in stationary torpedo defence.

In view of the recent consideration that a special committee has given to the question of the employment of the Marine Artillery, I feel unable to express a more definite opinion on the matter.

3. *Marines afloat in time of peace.*—The present force of marines ought on no account to be reduced, but in order to increase the number of seamen in the navy, or even without increasing the number, to give them more time in sea-going ships, it would be a very good thing to shorten the amount of foreign service performed by each marine in time of peace. This should be done by reducing the complements of marines in certain classes of vessels, and by retaining them at home when their quota of sea-service was completed.

I strongly deprecate the entire withdrawal of marines from service afloat.

C. *Petty Officers, Seamen, &c.*

1. Petty Officers.
2. Seamen, &c.

1. *Petty Officers.*—The present system as to the number of petty Officers allowed to ships, and as to their advancement, leaves room for improvement. Considering that there is a perpetual difficulty in obtaining petty Officers it would be better for Captains to have power, within proper limits, to rate up suitable men in addition to the complement. This would be a great encouragement to men to improve themselves, and would remove the temptation that now exists on the lower deck to induce time-expired men to go, in order to leave vacancies.

More chief and 1st class petty Officers should be allowed to sloops and smaller vessels than is at present the case; men of experience are not found in 2nd class ratings, and the aggregate of petty Officers in each of these vessels is small.

2. *Seamen.*—The separation between the navy and its rightful

reserve, the Mercantile Marine, has of late years, with regard to the seamen, widened to the dimensions of a gulf. The true cause of this is the present mode of raising men for the navy. It is remarkable how different men-of-wars' men are now in many respects from what they were only five and twenty years ago; at that time they were mainly drawn from places on the sea-coast, and most of them were acquainted with the sea by sight—in fact, they came from the same sources as the merchant seamen. A man then looked on employment at sea as the work of his life, and not as a matter of merely temporary interest to him.

At the present time, with the railways bringing inland places into close connection with the sea, and with the system of entering all our seamen as boys, a large number of them come from places remote from the sea; they know and learn nothing of seafaring matters beyond what they see in the navy, and they only look on their ten years as so much time to be got through, or on their twenty years as the means of enabling them to retire permanently to the shore. Our men now frequently know nothing about any boat or small craft work beyond the range of naval duties. A man-of-war's man, notwithstanding his neatness, his education, and his discipline, is no more welcomed in a merchant ship than a raw merchant seaman in a man-of-war. This is not a state that ought to continue, and every effort should be made to draw these services together.

D. *Retired Officers as a Reserve.*—From the retired Officers of the navy should be formed a reserved list of persons to be the first called out in time of war. These should be—

1. Commanders, Lieutenants, and Sub-Lieutenants.
2. Chief Engineers and Engineers.
3. Medical Officers.
4. Paymasters and Assistant Paymasters.

1. *Commanders, Lieutenants, and Sub-Lieutenants.*—Officers in these ranks should undergo a short training each year, alternately in gunnery and in torpedo work.

2. *Chief Engineers and Engineers.*—These Officers should be employed for from fourteen to twenty-eight days in each year in attending daily the dockyards and steam reserves, either for work or to view machinery, &c.

3. *Medical Officers.*—These should be appointed to the naval hospitals for fourteen or twenty-eight days in each year.

4. *Paymasters and Assistant Paymasters.*—These should perform work afloat for fourteen or twenty-eight days in each year.

The main object would be the same in each case, viz., to keep up the connection of these Officers with the service, and to keep them fully acquainted with all the changes, both of regulation and practice, in their several departments. The inducements to enter this reserve would be full-pay whilst serving each year, and time in the reserve counting for increase of pension, say one year to count as three months' service.

E. *Reserve of Naval Seamen.*—1. In addition to the Seamen Pensioners Force, a reserve of unpensioned seamen of the Royal Navy

should be formed as follows:—Men leaving the navy at the expiration of their first period of continuous service should be encouraged to join this reserve, which would be somewhat similar to that of the army. Advantages as to retaining-pay and possible pension would be the inducements held out.

2. All the seamen in Government tugs, coasters, and harbour craft should be either men-of-war's men drafted to this service, or else men of the reserve mentioned above. They should all undergo annually a short period of drill.

F. *Pensioners.*—Naval pensioner artificers should not be employed in the steam reserves in time of peace; were additional active naval artificers borne instead, there would be a larger supply for war. The work of the steam reserves must then be spread evenly through the year; but in slack time the men not required might be employed in the dockyards, very much to the benefit of their qualifications in their trades, and with consequent advantage to the navy.

G. *Coast Defence Corps.*—The "Stationary Torpedo Force" (see Chapter III, D. 13), composed of people entered in the usual way, and the "Naval Coast Defence Corps" (see Chapter IV, *q.* 2), both already mentioned, are temporary expedients to meet war occurring in present circumstances. But a complete force ought to be established in peace whilst there is leisure for giving it a careful organization;—it would embrace all the duties of the above-mentioned bodies. Service in this corps should be compulsory on seafaring people—first, because, whilst acknowledging the public spirit and energy of the present Volunteer Forces, it must be admitted that it would be impossible to raise and maintain in efficiency a voluntary corps so large and with such varied duties as the defence of the coast demands; second, because to defend the country in war is a solemn duty incumbent on all, and the annual drill to be required in peace is no hardship.

The Royal Naval Artillery Volunteers must by no means be discouraged, but they should be incorporated in the Coast Defence Corps.

The whole force should be arranged in three divisions.

1st, Royal Naval Artillery Volunteers.

2nd, Sea-going division.

3rd, Torpedo defence division.

The duties would be—1st, Royal Naval Artillery Volunteers, to man gunboats, floating batteries, &c., for the defence of harbours and the immediate coast. 2nd, Sea-going division, for service in coast defence ships, but not to be stationed more than 100 leagues from the coast; they would undergo twenty-eight days' training each year. 3rd, Torpedo defence division (formed in a manner similar to the temporary force mentioned in Chapter III, D. 13) in two sections—(*a*) The staff, a movable body; (*b*) The local body.

This division is for the work now undertaken by the Royal Engineers. The torpedo defence men would go through a course of, say, forty-two days' instruction in the first year, and of twenty-eight in each subsequent one. The instruction to be in handling of mines, cables, &c., in creeping and sweeping, and in all the heavy work, but not in the

electrical part, nor in the management of explosives. The local body will simply supply skilled and other labour; the scientific work and handling of explosives would be carried out by the staff, who will go to the different places, as they are required, to give instruction or for service.

The persons composing the sea-going division, and the local body of the torpedo defence division, should be taken from all seafaring people not under the Crown. The staff of the torpedo defence should be composed of competent persons, naval, military, or civil, and commanded by naval Officers.

The number of brigades of Royal Naval Artillery Volunteers ought to be greatly increased. Without naming every locality it will be sufficient to say that each port of importance would require its company of Royal Naval Artillery Volunteers and of torpedo defence men; ports adjacent to one another would be grouped together for this purpose.

It is evident that with a threatened invasion a large force of experienced torpedoists in the staff would be required round our coasts to conduct and direct the work of the Torpedo defence men.

H. *Royal Naval Reserves in the Colonies.*—Pending steps for utilizing in a comprehensive way all the forces of the empire, Naval Reserves should be established in each colony capable of doing so, and which has not already formed them. The Colonial Reserves might be divided into two bodies—one for general service at sea; the other for coast defence. This would not prejudice the further development of the system of marine defence.

J. *Discharge of seamen, &c., on termination of war.*—At the end of great wars some distress and some soreness of feeling is caused by the large numbers of absolute discharges of men. This is unfortunately almost unavoidable; but all temporary men who had served in the fleet, and were judged worthy to be employed again, should if possible be entered in the Reserves, so that they might not feel that their services being done with they were cast on one side.

It is probable that if after a naval war a proper scheme were ready, a very great increase and extension of naval Reserves in many branches would be possible.

Conclusion.

In bringing to a close the consideration of this subject—the best organization for distributing the personnel of the navy, &c., on an outbreak of war—it is desirable to glance once more at a few important points.

1. It is difficult to believe that the present strength of the materiel of the navy, especially in swift cruizers of the first class, can be considered sufficient, even allowing for the use of armed merchant vessels; and yet it is seen that the number of requirements assumed in this scheme, and based on the existing force, try in some respects the present personnel, both standing and of reserve, to the utmost. On any considerable increase in the numbers of ships the supply of many of the

branches would fail; and unless the retired lists and other suggested means give larger numbers than can be expected, many vessels will put to sea poorly officered and manned.

2. As to providing more seamen, a great deal may be done by losing not a moment on the approach of war and at once hurrying into service, for the purposes of drill and preparation, all the Royal Naval Reserve and large numbers of new entries even before embarking the Coast Guard Force.

3. A point of discipline, which merits more attention in the service than it often receives, is that of implicit obedience to command, simply for obedience' sake. The habits of delivering orders carefully and complying with them absolutely require to be more seriously studied and more generally enforced.

4. With regard to the defence of British commerce in time of war a system has been advocated of enabling merchant vessels to defend themselves against a cruizer of the enemy. It is questionable how far, judging from the now established usage as to land forces, foreign nations would be willing to recognize the right of vessels not bearing a national commission to defend themselves; and the difficulty would arise as to how far such vessels, if they bore a commission, could be considered different from privateers. What could prevent a merchant vessel, capable of defending itself, from taking an enemy's ship? Would this not be a close approach to privateering?

There are many similar objections which suggest themselves.

5. This is not the place to discuss the naval policy of the country; but there is connected with that policy one point which is never irrelevant when alluding to naval preparations—it is, that the power of development of "the navy, whereon, under the good providence of God, the wealth, safety, and strength of the kingdom chiefly depend," is cramped by a parsimonious economy.

A costly peace is far less expensive than a cheap war; may we be preserved from both; but true thrift enjoins complete and efficient, if not lavish, preparations.

Whilst, however, drawing attention to defects in the present system, it is not rash to prophesy that great alterations for the better will be made within the lapse of a short time. The changes in naval warfare have kept pace with the rapid advance of civilization during the present century; the problem of defending and—equally important—of conveying food to this country is yearly urging itself more on public notice. It now behoves every person who is interested in the welfare of the British Isles to bestir himself to acquire some knowledge as to how the country is to be defended; and until this spirit of inquiry is abroad the present ruinous system of starvation of our first and principal line of defence will continue.

Happily, there are signs that the feeling of the country is beginning to be roused, and that naval preparation is not to be left unconsidered by all but experts and officials. Vast have been the improvements in the materiel of our fleet, but great also has been the change in the personnel.

The training and standard of acquirements of the mass of the Officers

have been greatly raised, but the requirements also are much higher. The entry of the men at an early age has changed the localities and the classes from which our seamen are drawn, and the continuous service system has made easy the maintenance of a higher discipline amongst them. But whilst crediting the new system with the power of maintaining improved discipline, let it not be forgotten when and under whom the greatest forward step was taken, and how it was demonstrated that propriety of conduct whilst on leave was not more difficult of attainment than a more punctual performance of duty whilst on board. No one who knew the navy before 1860, and who was in the Mediterranean for that year and the two succeeding ones, can ever forget the great change then wrought, nor the perfect example set by the flagship of the Commander-in-Chief. Young Officers may accept as of ancient date the present raised and improved tone of the seamen, but it is little more than twenty years old, and there is too much cause to fear that the name of a great reviver of discipline in the British navy may remain in the category of "Forgotten Worthies."

Never were the duties of the navy of greater importance than at present; on it more than ever depends the safety of England, and on the integrity of England rests the preservation of the empire. Let, then, the personnel of the navy be true to itself and true to its country, spending and being spent, not only in battle but also in all that pertains to improvement of the service, improvement of others, and improvement of self. Let the aim be—the highest view—for each one to perform the task because it *is* his task, to do right because it *is* right, in singleness of heart and with unselfish aims, and then at his last moment will each be able, like the great hero of the profession, to say, "Thank God I have done my duty."

ESSAY.[1]

ON AN OUTBREAK OF WAR, WHAT IS THE BEST ORGANIZATION FOR DISTRIBUTING THE PERSONNEL OF THE NAVY AND OF THE RESERVES AMONG THE AVAILABLE WAR VESSELS, AND AMONG A PROPORTION OF MERCHANT VESSELS, AS AN AUXILIARY TO THE NAVY?

By Captain H. Cleveland, R.N.

"Si velis pacem, semper parate bellum."

The subject of this Essay is one of the most important of the numerous questions which press upon the naval administration; it possesses one great official advantage, inasmuch as its solution does not involve increased estimates, nor does it depend upon the good-will of the Treasury! It is simply one of departmental organization—an adaptation of means to an end—and, together with the machinery requisite to put it rapidly and economically into motion, should be well considered with the time, patience, and resource which peace places at our disposal.

This subject will, as indeed everything affecting our administration should, be considered entirely from a national point of view. We are much too apt to blindly imitate our Continental neighbours in their systems of organization, and to measure our naval efficiency by a comparison of the respective numbers of special ships, regardless of our own national peculiarities, insular position, and exceptional advantages. The circumstances of this Empire differ from those of any other nation in the world, and it consequently requires a very different organization for its naval and military affairs.

The rapidity with which warlike operations are now developed, the valuable property on the shores of our extensive Empire, the large number of British vessels with their valuable cargoes—estimated at 150,000,000*l.* sterling—constantly threading their way over the ocean to all parts of the world, and the vast quantity of food—17,000,000 quarters of wheat (out of an annual consumption of

[1] Honourably mentioned; the others were by Commander Kingscote and Captain J. H. Harris, R.N.

25,000,000)—required to be imported into these islands, render it a vital matter for us to be able to expand our naval forces with promptitude; our enormous mechanical and human resources, our splendid mercantile marine, and the patriotism of its owners, would, if properly organized, enable us to effect this with certainty.

The political necessities of this extensive and extended Empire, combined with the police duties of the sea, which an enormous commerce has imposed upon us, require the maintenance abroad during peace of large squadrons, composed for the most part of vessels admirably adapted to this purpose, but which would become a source of weakness and anxiety on a sudden outbreak of war. It is this dispersion of our naval resources, matériel and personnel, which renders the subject of this essay somewhat difficult to solve; but in the organization of the force for the discharge of these peace duties, the necessity for its expansion without derangement in the event of an outbreak of war must constantly be borne in mind.

To meet the multifarious duties which an ubiquitous trade has imposed upon us, the commercial world has been divided into "stations," as units of naval administration, although steam communication has confined the traffic to narrow zones—well called "commercial highways"—and considerably affected the conditions on which these stations were originally organized; still, the system continues to have many advantages, and, on war being imminent, could be readily adapted to the additional duty of patrolling these highways. This essay will therefore be discussed with reference to this organization; but an essential condition of its efficiency depends upon the existence of a depôt, conveniently situated and adequately protected, with stores of coal and dock accommodation, and, further to facilitate rapid expansion of the naval forces, ships in good repair and suitable to the station should be laid up in reserve at each of these depôts.

In reviewing a question affecting the defences of the whole Empire, one cannot avoid being struck with the insignificant part our numerous and wealthy Colonies take in it—some literally contribute nothing; and though Canada and the Australian Governments have recently organized a marine defence, it is in every instance isolated; whereas, to be efficient and economical, it should be in close connection with the Imperial system. All our Colonies—Crown as well as representative—should be invited to take a part in the defence of their respective commercial ports, and for this purpose to organize an adequate matériel and personnel acting in concert with the naval Commander-in-Chief of the station.

It is entirely beyond the scope of this essay to offer any opinion as to whether the matériel and personnel of the Navy are effective and sufficient; it will simply be confined to discussing the best organization for distributing the *existing* personnel amongst the *available* matériel; it will consider all men voted annually by Parliament as the "active force" of the Navy, those for whom provision is made to supplement this force on war being imminent being called the "reserve force;" and the most logical method of treating the subject is, first, to inquire what work the personnel will be called

upon to do on an outbreak of war, and who is available to do it, thus gradually leading up to the organization for its distribution. With this object the essay will be divided into five sections, and the introductory matter tabulated, with commentary sufficient to elucidate the tables. Matter which is outside the scope of the essay, but is still indirectly connected with it, will be enclosed in brackets.

I. What ships for war purposes are there available for manning at once?

II. How many men are required to man them?

III. How many men are enrolled in the active and reserve forces, and how many of these are at once available for service?

IV. How should these men be distributed amongst the available vessels?

V. *The subject of the Essay.*—What is the best organization for carrying out this distribution?

I. What ships for war purposes are there available for manning at once?

Table A answers this concisely. In it every ship on the Navy List is classified, and each class has its representative type and the strategical functions assigned it, upon which the *number* and *class* of men for manning it are based. (Some difference of opinion may exist as to this method of classification, but it is the one which most readily adapts itself to our present vessels; it fulfils all the requirements of our position as a great commercial nation, and it is the one generally accepted by most writers on naval subjects.)

The *battle-ships* are classed into "masted" and "unmasted," for the purpose of determining the class of men most desirable for manning them.

The vessels for *coast service* are divided into two classes: Class I, for service abroad, for the protection of our arsenals, depôts, and coaling stations, supplemented by torpedo-boats (1st class). Class II, primarily for the defence of harbours and coasts at home, and, when that object is secured, in attacking the enemy's positions and to cover the rafts and mortar-boats. The two Indian turret-ships and the "Cerberus" are here included, as also the "Royal Sovereign" and "Erebus," which, it may be said, are obsolescent if not obsolete.

The *gunboats* are for home defence and river defence, the Colonial gunboats being included.

The *torpedo defences* of the Empire are, by Treasury minute, entrusted to the Royal Engineers, who are to receive every assistance in men and boats from the Royal Navy. It is assumed, in estimating the number of men required for this service, that these defences would be confined to arsenals, depôts, and commercial ports, isolated attack upon undefended places being outside the range of modern warfare.

The *cruizers* are divided into three classes: their special function is to patrol the commercial highways, and to Class I is allotted that section liable to be attacked by an enemy's heavy cruizers; to Class II is assigned the more distant routes or the pursuit of any "Alabamas," and to Class III the patrolling of the remaining sections, and affording such protection, in the way of convoying, as may be

TABLE A.

The Matériel of the Navy (illustrating its demands upon the Personnel).

Classification.					Number.		
Class of ship.			Representative types.	Strategical function.	Built and building.	Available at once.	Men required to man them.
Battle-ships. (Armoured.)		Masted	Alexandra Audacious Minotaur	Blockading and encountering enemy's fleet.	20	17	9,670
		Unmasted	Colossus Dreadnought Camperdown		14	6	2,330
Coast service	Class I.	Armoured ships ..	Conqueror Rupert	Defence of strategical positions	7	7	1,560
		Torpedo-ships .. .. (1st Class.)	..		?	20	200
	Class II.	Armoured ships ..	Hecate, Cerberus Waterwitch	(*a*) Defence of ports and coasts (*b*) Covering rafts and mortar boats in the attack on forts.	15	10	1,460
		Gunboats	Mistletoe, Tay Comet		93	63	2,200
		Torpedo defences ..	..		..	..	5,850

Classification.			Number.		
Class of ship.	Representative types.	Strategical function.	Built and building.	Available at once.	Men required to man them.
Cruizers .. .. 1st Class (Protected) ..	Impérieuse Warrior Northampton	Protection of commercial routes flanked by enemy's naval ports	10	5	9,310
Cruizers .. .. 2nd Class	Inconstant Arethusa Volage	Patrolling distant routes	15	6	
Cruizers .. .. 3rd Class	Calliope Opal Modeste	Patrolling and convoying	35	18	
Sloops	Vestal Rapid Albatross	Police duties and co-operating with cruizers	41	21	2,700
Gun-vessels..	Racer Falcon Fly	Police duties and attendance on squadrons	52	28	2,520
Torpedo-ships	Polyphemus	Attached to battle-ships for counter-attack	4	2	170
Troop and store-ships	Malabar Himalaya Humber	Carrying troops to co-operate with Fleet	14	13	2,490

Classification.				Number.		
Class of ship.	Representative types.	Strategical function.	Built and building.	Available at once.	Men required to man them.
Chartered ships: Torpedo store and factory-ship ..	Hecla	One to each squadron of battle-ships	280 on Admiralty List	100 probable number required	10,800
Chartered ships: Coal-vessels	Merchant-ships on Admiralty List	Two ditto and depôt			
Chartered ships: Store-vessels		One ditto and depôt			
Chartered ships: Hospital-ships		One ditto			
Chartered ships: Despatch-vessels		Two ditto			
Chartered ships: Transports		Transporting troops			
Chartered ships: Cruizers		Patrolling commercial highways			
Royal Naval Reserve drill-ships	Brilliant, &c.	Drilling the Reserve Force	..	9	270
Training-ships	Excellent Britannia St. Vincent	Drilling the Active Force	..	9 (and 8 cruizers)	1,500
Yachts	Victoria and Albert Enchantress Helicon	..	..	12	740
Receiving-ships and miscellaneous	Duke of Wellington Indus Victor Emanuel	Distribution	..	14	2,000
Coast-Guard duties.	..	Patrolling the coast	..	9 divisions 28 cruizers	4,000
Marine barracks	..	Training recruits	..	4 divisions 1 depôt	900

required by slow steamers and sailing ships. (The number of cruizers could be economically and rapidly increased, when the necessity arose, if arrangements were made with the leading shipowners, so that merchant vessels, which would be placed on the Admiralty list when built, should, when designed and building, have fittings for additional bulkheads, armament, bunkers round engines and boilers, and even a recess for armour-belt provided, ready for conversion, on war being imminent, but during peace in no way affecting their condition as merchant ships.)

The *sloops* and *gun-vessels* require no comment; the former would supplement the cruizers on distant routes.

The *torpedo-ship* is a new class, represented as yet by the "Polyphemus" only. The "Vesuvius" is included in the table, but it is obvious she is not suited to keep the sea. (The torpedo-ram will play a conspicuous *rôle* in supporting battle-ships in future fleet engagements, and doubtless their number will be considerably increased when the submarine working of the Whitehead torpedo has been satisfactorily established.)

Troop and store-ships need no comment. The "Valorous" is included in the table. (If men were required to be landed after a bombardment, or for any temporary purpose, troops—marines if available—would probably accompany the fleet in these ships, the complements of the modern man-of-war not being adapted to landing any large force.)

Chartered ships would form a large addition to our naval resources. The duties it is proposed to assign them are stated in the table. Of the 280 merchant ships on the Admiralty list, 40 have a speed exceeding 14 knots, and at the same time have a large coal supply. (The factory ship is an innovation rendered necessary by the numerous and complicated machinery on board of our larger vessels. The torpedo store-ship, now represented solely by the "Hecla," could, in addition to carrying the gun-cotton mines for the fleet and second class torpedo-boats (to supplement those in each ship), be fitted up for this purpose.)

The drill-ships for the reserve, and the training-ships for young gentlemen, boys, gunnery and torpedo, would be kept in full swing during war.

II. How many men are required to man the above ships?

This information is given in Table A, and is based upon the existing complements of ships. The number assigned to *torpedo defences* is somewhat speculative, there being at present no data for forming a correct estimate. (When the defences of the Empire are thoroughly organized, it will probably be found most advantageous to place this branch entirely in the hands of the Navy.)

The number of the cruizers would doubtless be increased from the chartered ships; but as this, under existing arrangements, could not be effected *at once*, no greater number of men has been assigned than is required for the available war-ships.

The numbers for the drill and training-ships are for purposes of instruction and ships' duties. They do not include the men and boys under training.

The numbers of receiving ships are chiefly for ships' duties. (When barracks are established this number will be considerably reduced.)

The numbers for the marine barracks comprise the staff but not the recruits.

III. How many men are enrolled in the active and reserve forces, and how many are at once available for duty?

Table B furnishes this information. The figures quoted, though only approximate, are sufficiently reliable for all practical purposes. Taking the active force first, to give a clear idea as to the extent it can be relied upon for expansion, an analysis of its present distribution is appended. It will thus be seen that one-third of the whole force is always abroad, and another third (approximately) dispersed amongst ships at home. When our seamen at home are concentrated in barracks, a large portion of this latter third will be available for service afloat. The number of Officers enrolled is 4,620, but the number annually voted is only 4,000 (2,598 commissioned, 577 subordinate, and 825 warrant), which accounts for the apparent dis-

TABLE B.

The Personnel of the Navy.—Number of Men in Active and Reserve Forces.

Active force.		Enrolled.	Available at once.	Present distribution of active force.
Officers (excluding 70 in C.G.).		4,550	4,550	Number annually voted (A + B) 57,500. Service on shore (A).. 13,500. Service afloat (B) .... 44,000.
Seamen	Petty officers	3,600	3,600	Analysis of A.
	Leading S. and A.B's.	10,000	10,000	Coast Guard, 4,000; Boys under training, 3,200; Marines—staff and recruits, 3,000; ready to embark, 3,300.
	Ordinaries....	6,300	6,300	
	Coast Guard (on shore).	4,000	4,000	Analysis of B.
	Boys	5,200	2,000	(*a*) Abroad..... 19,000. (*b*) At home ..... 25,000.
Engine-room staff		4,800	4,800	(*a*) Mediterranean, 5,000; China, 2,800; N. American and W. Indies, 1,900; E. Indies, 1,900; Pacific, 1,600; Australia, 1,200; Cape of Good Hope, 1,100; S.E. America, 500; surveying service, 500; Imperial troopers, 900; particular service, 500; Indian troopers, 1,000. (*b*) Channel squadron, 3,300; reserve squadron, 3,700; home ports, ships ordered home, drill and training ships, &c., 18,000.
Artificers.....		2,300	2,300	
Non-combatants		4,500	4,500	
Marines	Artillery	2,300	1,900	
	Infantry	10,100	8,500	
Total active force ..		57,650	52,450	

Reserve force.		Enrolled.	Available at once.
Officers		380	300
Royal Naval Volunteers...	1st class[1]	11,000	7,000?
	2nd „ [1]	6,000	5,000
	3rd „	110	100?
Royal Naval Artillery Volunteers		1,600	1,500
Seamen and Marine Pensioner Reserve		1,750	1,700
Pensioners (of all ages and conditions)	Seamen	15,129	4,000 (able-bodied and under 50)
	Marines	7,181	
Total Reserve Force		43,150	19,600
Enrolled under Colonial authority...	Canadian Marine Militia..	?	?
	Victoria	4,000	?
	New South Wales	?	?
	Queensland	?	?
	Tasmania	?	?
	New Zealand	?	?
	South Australia	?	?
	Western Australia	?	?
Grand Total in both forces (excluding Colonial)..		100,800	72,050

crepancy in the table. The seamen engage to serve for ten years from the age of 18, and about 70 per cent. re-engage for a further service of five and ten years, which entitles them to a pension at 38, but petty officers and coastguard men are encouraged to serve still longer. The men in the coast guard are here considered not in the reserve, but as forming a part, and a very important part, of the active force. The boys, after two years in a training-ship, are rated 1st class and sent afloat, attaining to man's rating (ordinary seaman) at the age of 18. Of the 5,200 enrolled, 3,200 are under training and 2,000 afloat.

The engine-room staff includes engine-room artificers and stokers, but not Officers.

The artificers include shipwrights, blacksmiths, armourers, &c. The non-combatants comprise police, domestics, &c. Of the marines, numbering in all 12,400, about one-half are always afloat and the other half in barracks, consisting of the staff, estimated at 900, recruits at 2,000, and men ready to embark, 3,300.

The reserve force is composed of several classes, men of different habits, and employed in various industries. Those formerly called the Royal Naval Reserve, which confused them with the general term of the whole force, are now styled Royal Naval Volunteers; they are divided into three classes, but Class III, being so very insignificant, will only here be considered as merged with Class I. By a recent regulation, the Royal Naval Volunteers are to consist of 20,000 men,

[1] To be 10,000 in each.

10,000 in each class, Class I to consist of men who have been eight years at sea, three of which must have been as A.B. on board a foreign-going vessel or regular coaster, and who are under 30 years of age on entering.

Class II to comprise men who have led a seafaring life, three years of which as ordinary seamen, and are between 19 and 30 years of age on entry.

The number available at once of both these classes is somewhat speculative, but *all* who are away in foreign-going vessels, being recorded in the ships' agreements, are known at the registrar's office immediately they leave the country. The whereabouts of the others are only known every six months, unless they appear for drill or their quarterly retaining fee.

The Royal Naval Artillery Volunteers are at present only enrolled in three brigades, for the protection of the ports of London, Bristol, and Liverpool; any person physically fit and above the age of 17 may be enrolled in this corps.

The Seamen and Marines Pensioner Reserve number about 1,750; they are composed of men from the pensioner's list, who, for the consideration of getting the Greenwich "age" pension at 50 years o age, instead of 55, and pay and allowances of an A.B. (N.C.S.) (3*s.* a day), during fourteen days a year, undertake to serve at any time on war being imminent.

The remaining pensioners number about 15,000 petty officers and seamen, and 7,000 marines, but of these a great many, whose number is not accurately known, are above 55, the limit of their legal liability to serve, and also incapacitated from sickness, &c. It is estimated that 4,000 of these are under 50, and able to serve.

The number enrolled under Colonial authority is not known with sufficient accuracy to warrant recording. All the Australian governments have organized a force for marine defence, and Victoria has enrolled 4,000 men. Canada has also a marine militia, but the number available is not known.

IV. How should these men (those available at once in the active and reserve forces) be distributed amongst the available vessels?

Having taken a survey of the matériel and personnel at our disposal, we are now better prepared to consider the best mode of distributing the latter amongst the former, and Table C contains this proposed distribution; it is based, as nearly as possible, upon the existing proportions in the manning of the fleet, the combatants being slightly increased, and the men are assigned to the several services considered most suitable to their previous habits and modes of employment. In the preparation of this table arrangements are made to call out a proportion of *every* branch of the reserve force on war being imminent; this is considered as highly important, not only to impress the men with a reality of their liability to serve the State, for which they are receiving a pecuniary consideration, but to prevent confusion if a further expansion of the naval force should be required. For instance, the coast guard duties are assigned to the pensioners as being at first the most suitable re-introduction of them into the

TABLE C.—*Proposed Distribution of Active and Reserve Forces amongst Available Ships on the Outbreak of War.*

Class of ship.	Number of men required. (Table A.)	Officers.		Active force.								Reserve force.					
				Combatants.					Engine-room staff.	Artificers.	Non-combatants.	Royal Naval Volunteers.		Royal Naval Artillery Volunteers.	Pensioners.		Enrolled under Colonial authority.
		On active list.	Royal Naval Reserve.	Petty officers, L.S. and A.B.	Coast Guard men.	Ordinaries and 1st C. boys.	Marines.					1st Class.	2nd and 3rd Class.		"Seamen Reserve."	Others liable to service.	
							Artillery.	Infantry.									
Battle-ships { Masted (17)	9,670	800	...	2,000	700	2,700	...	1,000	1,080	510	880						
Battle-ships { Unmasted (6)	2,330	180	...	200	600	...	700	...	320	120	210						
Coast Service I { Armoured ships (7)	1,560	170	...	230	300	...	350	...	280	90	140						
Coast Service I { 1st Class Torpedo-boats (20)	200	20	...	120	...	...	...	...	60	...	...	...	...	...	...	...	?
Coast Service II { Armoured ships (10)	1,460	170	...	80	200	...	300	...	200	60	100	...	...	...	...	...	350
Coast Service II { Gunboats (63)	2,200	220	...	300	...	400	...	360?	450	180	190	...	...	?	...	...	100
Coast Service II { Torpedo Defences	5,850	50	150	500?	...	...	...	...	150	...	...	...	4,000	1,100	...	...	?
Cruizers (29)	9,310	950	...	2,000	...	3,000	...	900	1,040	490	930						
Sloops (21)	2,700	270	...	460	...	1,050	...	210	300	140	270						
Gun-vessels (28)	2,520	250	...	400	...	1,000	...	230	280	130	230						
Torpedo-rams (2)	170	17	...	80	...	...	...	20	30	10	13						
Troop and store-ships (13)	2,490	200	...	1,400	...	...	...	200	280	130	280						
Chartered ships (100)	10,800	800		...	...	...	...	3,000	...	...	...	7,000					
Reserve drill-ships (9)	270	36	...	130	...	...	...	...	...	27	27	...	...	...	50		
Training-ships (9) for active force	1,500	200	...	350	...	...	...	200	30	150	170	...	...	...	400		
Yachts (12)	740	70	...	340	...	...	...	100	100	50	80						
Receiving ships (14) and Miscellaneous	2,000	250	...	250	...	...	...	250	30	100	270	...	...	...	850		
Coast Guard duties	4,000	70 Divisions 250 Stations 50 Cruizers		...	1,630	...	...	...	...	...	...	...	...	...	...	2,000	
Barracks (Marine)	900	...	...	...	...	...	200 Staff	700 Staff									
Total required	60,670	4,573	300	8,840	3,430	8,150	1,550	7,170	4,630	2,187	3,790	7,000	4,000	1,100	1,300	2,000	?
Number available (Table B)	72,050	4,620	300	13,600	3,630	8,300	1,900	8,500	4,800	2,300	4,500	7,000	5,000	1,500	1,700	4,000	?

Service, but so as not to derange the existing routine, only half the coast guard men (the youngest men), who have been well drilled and disciplined, are drafted into the ironclads; if further expansion were required the other half of the coast guard men would be drafted afloat and their places filled by a corresponding number of pensioners; and if still further expansion was needed, the pensioners first embodied would be drafted afloat, and so on without any re-arrangement of duties being necessary.

This method of distribution also admits of a proportion of both the active and reserve forces being available for drill in gunnery preparatory to embarkation. This is shown in the two lower columns in Table C, being the difference between the number required and the number available.

The *Officers* are distributed in the table in the same proportion to the men as at present. Seven executive Officers are allotted to the chartered ships, who should belong to the reserve forces when the ship is commanded by an Officer of the Royal Naval Reserve. A combatant Officer on the active list (a marine Officer if available) being on board every ship to superintend the working of the guns, &c.

Petty officers or A.B.'s have been allotted in small proportions to *every class* of ship to maintain the routine and discipline of a man-of-war; the A.B.'s are classed with the petty officers, and distinct from the young ordinaries, on the assumption that they can, if necessary, perform petty officers' duties. In the masted battle-ships, where the work is heavy, their numbers are proportionally large; as the naval forces required expansion these men would be withdrawn from the troop, store, and receiving ships, and their places taken by first class volunteers (reserve) and pensioners.

The *coast guard men* are distributed amongst the ironclads, the younger half going afloat, the other half remaining at their stations to instruct the pensioners.

The *ordinaries* and *first class boys* have been distributed into the class of ship where their training and development would be most likely to receive attention.

The *marine forces* are the backbone of our Service, and in this scheme of distribution have been largely utilized. The Marine Artillery, being a strong, highly intelligent, and well disciplined body of men, are allotted to the turret-ships in sufficient numbers to work the heavy guns, and the light infantry to the chartered ships, thirty to each, to assist in working the guns and forming an efficient small-arm party, they are also distributed in the present proportions to other ships.

The *engine-room staff* is distributed in much the same proportions as at present, and the numbers enrolled are about equal to the immediate demand.

The number of non-combatants (servants, police, &c.) has been somewhat reduced, as it is considered many occasional duties assigned to them—such as schoolmaster (in seagoing ships), writer, yeomen of stores, cooks' mates, barber, butcher, tailor—could be as

well performed by men of the combatant branch receiving a remuneration for the extra duty.

The *Royal Naval Volunteers* have been distributed in a manner best suited to their previous mode of life, and it has been considered expedient not to mix them with the men of the active force. With this object in view, the volunteers of the first class have been assigned to the chartered ships, and those of the second class to the coast defences, where, if selected, as is hereafter proposed, from the home trade, fishing industry, and boatmen, their local knowledge and aptitude for boat work will be found most valuable.

The *Royal Naval Artillery Volunteers* are allotted to the gunboats employed in the defence of their own ports, which would be placed under the command of an Officer on the active list. (It is hereafter proposed to merge these into the second class Royal Naval Volunteers.)

The *Seamen and Marine Pensioner Reserve* is distributed among the training and receiving ships for ship work, leaving the petty officers, &c., of the former free for instruction, and releasing the crews of the latter for more active service afloat. (It is also hereafter proposed to abolish this distinction from the other pensioners.)

The other pensioners liable to be called out to serve are assigned to coast guard duties, releasing the coast guard men for service afloat. (These men would also be distributed amongst the training and receiving ships if the pensioners reserve was abolished.)

To the force enrolled under Colonial authority is assigned the duty of manning their own war vessels, and defending their commercial ports.

V. *The subject of the Essay.*—What is the best organization for carrying out the above distribution?

If the proposed scheme of distribution elaborated in Table C is right, there is little difficulty in devising an organization to give it effect; it is in fact simply putting the machine into motion. It is wise to adhere, as far as one can, to existing systems. Changes being of themselves objectionable, the following suggestions will therefore follow the lines of our present organization, but aim at making it more effective by infusing a reality into the reserve forces which they do not at present possess, simplifying some of the details connected with both forces, to facilitate expansion, and ensuring a rapidity of mobilization which, in the present day, is the keystone of all organizations.

It is very evident, on examining Tables B and C, that the numbers of the personnel (if all were mobilized) are in excess of immediate requirements. It will be seen from Table A that 60,000 men, exclusive of sick and other casualties, will be required on the first outbreak of war, and it has been shown on Table B that 52,000 are alone available from the active force, 8,000 men from the reserve force are therefore required, and Table C details their composition and distribution. Moreover, one is struck with the numerous classes which compose the reserve forces. Men of different habits and interests, whose distribution, in a manner suitable to their antecedents, involves some difficulty.

When the force of Royal Naval Volunteers is established on its new basis, by which 10,000 men are allotted to each class, and when the legal liability of all pensioners under 50 (now 55) years of age to serve the State is fully recognized and enforced, it would considerably simplify the organization for distribution, if the "Royal Naval Artillery Volunteers" were abolished, the "Seamen Pensioner Reserve" cease to exist as a distinct class from "the Pensioners," and the "Reserve Force" be confined solely to "Pensioners" and "Royal Naval Volunteers," so that on the issue of the proclamation calling a portion of the reserve forces into active service, the first class of the Volunteers, the second class to coast defence, and the pensioners first to coast guard duties, and subsequently, when necessary, to service afloat, in both cases retaining their pensions.

It has been proposed in the introductory remarks to this essay that suitable ships should be laid up in reserve at the station depôts; if this were adopted crews should be sent out in fast steamers when war was imminent, and thus the naval forces in any or every part of the world could be expanded with considerable rapidity.

I. *The Active Force.*—So long as we are without seamen's barracks, and the men are dispersed in the home ports as disposable supernumeraries, there is little room for any improvement upon the present system of drafting them. The rosters of these supernumeraries, both at home and abroad, require to be more rigidly adhered to, and, in case of petty officers and leading seamen, home and foreign service (which latter in peace time, with the present facilities of communication to all parts of the world, might well be reduced from three to two years) should be alternate, with the option of making one exchange; due notice should be given when drafts are required, and men should be selected from those longest on the roster, independent of the port or length of their service, and in no case (as sometimes happens) should men be sent to a foreign station with scarcely any warning. Ordinaries and boys should be drafted into seagoing ships immediately they leave the training ships, as supernumeraries into the Channel Fleet till there is an opportunity of disposing of them; but the number of able-bodied men in the complements of the large ships should not be reduced for the purpose of absorbing them. The complements of all ships require revision to meet the recent introduction of torpedoes and machine-guns, and so that every man may be readily accounted for at home or abroad, that disturbing factor, the "permanent supernumerary," should be abolished.

It would much facilitate distribution if, instead of the present specific and numerous ratings of the executive petty officers, they were simply designated and drafted as chief, first or second class, their qualifications for these ratings, in addition to character, depending upon their efficiency as marksmen at great guns or small arms, or special aptitude in torpedo manipulation; the time has also arrived when every seaman in the active force should be proficient in the working of great guns and small arms, and therefore, as they tend to convey a contrary impression, the ratings of "seaman gunner" and "trained man" should be abolished; but to encourage and

reward exceptionable marksmen at the heavy guns, a liberal allowance should be granted to them. The proposed regulation directing every seaman gunner to go through a torpedo course is, it is submitted with deference, a grave mistake, as, apart from its interfering materially with the service of men in seagoing ships (where alone they can practically apply their knowledge and improve their gunnery training), they can learn little about torpedoes in the time allotted. The knowledge required for a good torpedo man takes a long time to attain, and constant practice to keep up; a smattering of torpedo manipulation is fraught with greater danger to friend than foe, it is therefore submitted that a special torpedo corps should be organized for the torpedo duties of the fleet; it should consist of men specially selected by their personal qualifications, be highly trained, and be by no means large, and, it need scarcely be said, be well paid. The allowances now given to seamen gunners and trained men should be transferred to marksmen and torpedo men.

The engine-room staff, though a very important element, is the weakest in the naval force; there is no "reserve," and the present number is only just sufficient for the first mobilization; it is proposed that the complements of engine-room artificers and leading stokers in all ships during peace should be in excess of the number actually required for the work of each ship, and this excess transferred to other vessels—on foreign stations to the ships in reserve at the depôt—when war was imminent; and, further, it is suggested that at every tropical station depôt a certain number of natives—British subjects—should be organized for service in the stoke-hold, a proportion being employed during peace in the ships on the station. In temperate climates seamen and marines should be encouraged to work in the stoke-hold as in other parts of the ship. A proportion of the artificers of ships in tropical countries should also be composed of natives.

Non-combatants, especially domestics, would be entered from the shore, as at present, when required; but, as has been previously mentioned, their number might be advantageously reduced, and a corresponding number of combatants embarked.

If the proposed distribution of Marines be adopted, as soon as they are embarked, a proportional number of recruits must be enlisted to support them; it is suggested, on the score of economy, that the two Portsmouth divisions be amalgamated at Eastney, and the file of the force increased in proportion to the saving effected by the reduction of staff, &c.

Officers should be appointed as at present, but the Captain and heads of departments should join the ship at least a month before she is commissioned; should there not be sufficient commissioned Officers in the higher grades, those in the lower should be appointed as "acting," becoming absorbed by vacancies or (on supersession or cessation of service) reverting to their original rank. When there are not sufficient subordinate Officers for quarter-deck and boat duties, warrant officers and petty officers are to be selected to take their place. For duties connected with coast defences, retired Officers under fifty years of age should be called upon to serve if necessary.

The former system of increasing the active list of Officers during war being destructive to the maintenance of an efficient service.

II. *Reserve Force.*—As is shown in Tables B and C, this force at present consists of the Volunteers (three classes, 1st, 2nd, and 3rd), the Artillery Volunteers, Pensioners (two classes, the "Seamen Pensioner Reserve," and the "Pensioners" under fifty-five years of age), and an indefinite though highly important adjunct, "the force under Colonial authority." There is no doubt that in the Volunteer we have a valuable class of man, and if called out there would be found few defaulters. The present system of enrolling and forwarding to the rendezvous through the agency of the registrars of shipping cannot well be improved upon; they know the men, their habits, and, in most cases, their whereabouts; they appear to take great interest in the work, and the only question is whether they are adequately remunerated for the trouble which the numerous Returns (all of which are necessary for the efficiency of the force) entail. It is undisputed that the chief factor in the value of any force is an accurate knowledge, at any moment, of its available strength; the regulations here seem to be deficient by limiting this knowledge to an interval of six months—they require a Volunteer going abroad for "more than six months" to obtain leave. He may wander over the United Kingdom, or in a ship trading between the limits of the Elbe and Brest ("home trade"), or be incapacitated for active service by serious sickness for six months, and nothing be known of him if he did not apply for the quarterly retaining fee. In the first case—when he is ordered to obtain leave—the fact is otherwise known to the registrar by "the agreement" of a foreign trading vessel, wherein all particulars relative to the Volunteer are recorded, being lodged in office immediately the ship leaves the port, as well as on her return, and this in addition to the man appearing personally before the registrar to sign it, but the agreement for home traders is not lodged under six months, nor do the crew appear before a registrar to engage; to remedy this defect, it is proposed to enroll the first class men entirely from foreign-going ships (the class of ship into which it is proposed to distribute them), and the second class men entirely from home traders, fishing industry, and boatmen; both classes to report to the registrar when they are incapacitated for service *from any cause*, and the second class to notify when they intend to leave and when they return to the port of registration, whether the voyages are short and successive, or otherwise. The present regulations avail for the first class man so long as he engages only in a foreign-going vessel, the power given to the registrar by the regulations to withhold leave being sufficient (if the interval of "more than six months" were expunged), and if an emergency required the retaining of men at home (but the issue of the proclamation was not advisable for political reasons) those so retained should be allowed lodging and subsistence money, viz., 1*s.* 8*d.* a day. The regulation which gives power to naval Officers abroad to take Volunteers out of merchant ships, should, it is submitted, be modified; it would disable the ship, and should therefore only be exercised to man a chartered ship

when equipping abroad, and in this case a notification should be sent home to the registrar of the district. Moreover, it is questionable policy to take any step that would alienate the shipowner, from whose goodwill and co-operation the State promises to derive much advantage. To facilitate the distribution of the Volunteers when called out, a rendezvous should be established as a centre for certain districts; it is suggested that Dundee, Greenock, Liverpool, London, and Southampton should be the centres to which the registrars of the ports within their circle should forward their men on the issue of a proclamation. The third class Volunteers to be abolished as a special class, and be merged into the first class.

It would much simplify organization if the Royal Naval Artillery Volunteers were merged into the second class of the Royal Naval Volunteers; the duties (as proposed) would be similar, and considering the class of society from which these men are drawn, it could hardly be expected (though their patriotism evinced by the zeal and self-sacrifice with which they have striven to qualify themselves is highly commendable) they would be able to give their services continuously and for an indefinite period. The force, as at present composed, is small—1,600—only a fraction of what would be required in a great war.

The pensioners should form the most reliable and efficient reserve of any force, owing to their past training and habits of discipline. It is not sufficiently understood in the Service that all men under 55 years of age receiving a naval pension are liable to be called out by proclamation to serve the State; it is true they are told this on leaving the active service, but few, if any, believe in its reality; moreover the recent creation of the Seamen and Marine Pensioner Reserve as a special class has done much to confirm this impression. It is proposed to abolish this distinction at once, the only inducements for the men to enrol themselves in it being, first, two guineas for a fortnight's drill each year, which can be of little practical use to men whose whole life has been one of continuous drill, and secondly, the prospect of an age pension five years sooner, viz., at fifty instead of fifty-five. It is proposed to make this liability of all pensioners to serve more of a reality by dispensing with these distinctions, by giving the age pension to *all* pensioners of fifty years of age who have been called out by proclamation, by reducing the age of liability from fifty-five to fifty, by dividing them into two classes dependent upon age—Class I to comprise all pensioners between thirty-eight and forty-five, and Class II all between forty-five and fifty—by bringing them into more intimate connection with the Officer of their district, rendering it imperative upon them to report to him any cause which may render them incapable to serve, any change of, or absence from, their usual place of residence; by fixing a rendezvous—which it is proposed should be the chief office of the coast guard district—to which each pensioner is to repair (or be forwarded) within twenty-four hours of the issue of the proclamation calling his class out for service, and by securing to them their pension, and, if employed afloat, the reversion to their last rating.

In the Introduction it was incidentally mentioned that all the Colonies should be invited to organize a marine defence for their commercial ports, and, what is most important from an economical as well as defensive point of view, to bring it into efficient co-operation with the Imperial system, which would embrace all the commercial highways: without interfering with the internal economy of this force, the Commanders-in-Chief of all stations should be directed to act in concert with the respective Colonial Governors, who should be similarly instructed, and the gunnery and torpedo Officers on the station should assist in its organization and development.

To Recapitulate.

I. The distribution to be so arranged as to include *every branch* of both the active and reserve forces, and to be in harmony with the previous habits and industries of the men.

II. *The Active Force.*—The continuance of the present system of drafting men in the active force, with the following modifications to facilitate it:—

(*a.*) The revision of complements, with reference to the recent increase of armaments, and the reduction in the number of non-combatants.

(*b.*) The appointment of heads of departments some time before commissioning a ship, and, to avoid permanent increase of the list of Officers, to appoint acting Officers when more of a grade are required than are available on the peace establishment.

(*c.*) The present special ratings of seaman gunner and trained man to be abolished. High remuneration given to superior marksmen at heavy guns.

(*d.*) The formation of a small and highly-trained torpedo corps for the torpedo duties of the Fleet, and an abandonment of the proposed attempt to make every seaman gunner a trained torpedo man.

(*e.*) Executive petty Officers to be designated only as "chief," "first," and "second" class, their qualifications being superior marksmen and torpedoists.

(*f.*) The maintenance afloat during peace of a larger engine-room staff—artificers and leading stokers—to facilitate expansion when war was imminent.

(*g.*) The enrolment at every tropical station depôt of native stokers and artificers (British subjects).

(*h.*) The amalgamation of the two Portsmouth divisions of Marines at Eastney, and the increase of the force in proportion to the saving effected thereby.

III. To facilitate rapid expansion, the laying up in reserve of suitable vessels at all station depôts which are adequately protected and possess dock accommodation, sending out men when war was imminent.

IV. *The Reserve Force.*—(*a.*) The calling out by proclamation of a *portion* of *every branch* of this force whenever war was imminent.

(*b.*) The simplification of the organization of this force by abolishing the Third Class Royal Naval Volunteers, the Royal Naval

Artillery Volunteers, and the Seamen and Marine Pensioners Reserve, merging them respectively into "the First Class," "the Second Class Volunteers," and "the Pensioners."

A.—The Royal Naval Volunteers.

(*a.*) The maintenance of the present system of enrolling these men, with following qualifications.

(*b.*) The merging the third class into the first.

(*c.*) The first class to be enrolled only from foreign-going vessels; the second class only from coasting vessels, fishing industry, and boatmen.

(*d.*) The imperative necessity of every man reporting his incapacity to serve from any cause, his change of district, and, in the case of the proposed enrolment of the second class, these men to report their absence from and return to their district on every occasion, not, as at present, limited to an absence of six months.

(*e.*) These men not to be removed from their ships abroad, unless to man a chartered ship.

(*f.*) If leave to absent himself from district is withheld, subsistence and lodging money to be granted.

B. *The Pensioners.*—(*a.*) The making the present liability of these men to serve in case of war a *reality*.

(1.) By abolishing the Seamen and Marine Pensioners Reserve as a distinctive class.

(2.) By reducing the age of liability to serve from 55 to 50.

(3.) To extend the Greenwich Age Pension to *all* pensioners on attaining the age of 50 who have, as such, served the State.

(*b.*) Dividing them into two classes dependent upon age: Class I, 38 to 45; Class II, 45 to 50.

(*c.*) Making it imperative upon them to report to the Staff Officer of their district—

(1.) Incapacity to serve from any cause.

(2.) Change of, or absence from, their usual residence.

(*d.*) A fixed rendezvous, to which each pensioner is to repair on the issue of the proclamation, to be pre-arranged; the chief officer of the coast guard districts is suggested.

V. The "force enrolled under Colonial authority."

(*a.*) The organization of a marine defence in *every* Colony.

(*b.*) The co-operation of the naval Commanders-in-Chief with every Governor within his station for its development and efficiency.

The discussion of this essay is now exhausted; it has involved a rapid survey of our naval resources, both matériel and personnel, which a clear comprehension of the subject rendered necessary. The tables furnish the data upon which the arguments have been based, and although the figures quoted in them do not lay claim to absolute accuracy (which it is impossible to obtain without access to official documents), they may be relied upon for all practical purposes. There is not much room for improvement in our existing organization; a great stride has been made in late years to place the personnel on an efficient footing, and the result is highly encouraging and satisfactory.

The suggestions here proposed are neither startling nor revolutionary; they aim chiefly at simplification, greater utilization of existing material, and giving more reality to the reserve forces, with a more rapid mobilization than our present system provides. Though every effort has been made to avoid irrelevancy, it has been found impracticable to disconnect the distribution of the forces, and organization for giving it effect, from a reference to their source, composition, and internal economy. The result is submitted for consideration and discussion, fair and candid criticism being the surest way of arriving at the truth. The writer will consider himself amply repaid for the labour entailed in the compilation of this essay if the ideas herein promulgated contribute, even in a small degree, to the improvement of the personnel of the Service upon which the safety and prosperity of this Empire so much depends.

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OCCASIONAL PAPERS.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

GENERAL von STOSCH AND THE GERMAN NAVY.

Translated from the "Frankfurter Zeitung," by Major GUNTER, Garrison Instructor, S.E. District.

WHEN General v. Stosch resigned his post as head of the German Admiralty in the early part of the year 1882, he was glorified with a renown that could scarcely have been more brilliant had he been the greatest reorganizer that history has ever known. That he had become the creator of our new Navy was easily asserted and almost more easily proved. For this it was only necessary to compare the number of our ships and the condition of our harbours in the spring of 1871, when General v. Stosch took over office, with the state of things in the beginning of 1883, when he retired from it, and thus the measure of his deeds as regards *quantity* would be obtained. Nor was this all. According to the views of his admirers, the *quality* of the Fleet bequeathed to his successor left nothing to be desired; and if here and there people existed who held contrary opinions, they were wise enough, especially if they belonged to the Imperial Navy, to keep them to themselves.

Amidst the flood of adulation which greeted the departing administrator, nothing was more flattering than the address presented to him by the great industries which he had employed in the reconstruction of the Navy. We may comfort ourselves with the thought that the degree of praise bestowed upon the merits of the Minister was in proportion to the amount of profit extracted from his official acts by those industries. Nothing excited their admiration more than the energy with which he had elaborated and carried out his idea that all work and material for the service of the Navy should be forthcoming within the German Empire itself.

In this we also recognize a real merit in General v. Stosch, and would join with heart and soul in the hymn of praise, were it not that in his measures he had left out of consideration one indispensable condition, and hence the good intended by him was turned to evil in only too wide a sense.

When General v. Stosch took over the administration of the Navy immediately after the end of the Franco-German War, circumstances were peculiarly favourable for carrying out the plan of making the Navy independent of foreign countries for both its reconstruction and maintenance.

We may here remark, by the way, that General v. Stosch by no means originated this idea. The plan had been contemplated by his predecessors, and especially by Prince Adalbert, but want of money for costly experiments prevented its earlier development.

The payment of the French war indemnity filled the Treasury to overflowing, and 50 or even 100 millions of marks could easily be diverted from this channel into the stream flowing into the Admiralty chest in order to undertake some special work. General v. Stosch made these supplementary demands for extraordinary expenditure, and therewith undertook to construct a powerful new Fleet in an extraordinarily short time, by clearing at a bound several stages of the usual process of development.

The undertaking was in truth no easy one, nor was it made easy to him. There were at that time, for example, many Officers of high rank in the Navy who placed faith only in English engines, denied altogether the possibility of reliable engines being made for the larger class of vessels in German workshops, and certainly they could point to painful experiences in this matter. General v. Stosch made short work of such criticism. He removed without hesitation all those who would not support him heartily in carrying out his ideas, and expressed his determination to have everything that the German Navy required procured in Germany.

Here was a fine field for his energy, and if, in carrying out experiments on a large scale, everything did not go smoothly, and many costly failures occurred, the risk had to be run, if so important an object were to be attained. He was, therefore, not to be blamed for these failures, for the expenditure of millions without any immediate object, and for the fact that many things procured in Germany cost three or four times as much as similar articles of better quality could have been purchased for abroad. That was to be expected, and was somewhat condoned by the good old commercial principle that something must be sunk in the business first in order to make the thing go better afterwards. The fault of General v. Stosch lay in another direction, and the consequences to the German Navy have been serious.

The General never could bring himself to acknowledge that anything he undertook was ever near being a failure.

When he was appointed head of the Navy, he had a very poor opinion of the powers of work of the Navy, as he himself declared, in his celebrated speech in Parliament. He found, indeed, as is easily understood, for he made no secret of his opinions, dutiful obedience but not exactly responsive support, and therefore, at the time when the first fruits of his new-born activity appeared, he looked upon all delays and exceptions to his measures which were proposed to him not as indications of the opinion of experts that were worthy of consideration or discussion, but as resistance to his authority, or the senseless objections of pedants who had become fossilized in their old habits and customs, and as so many stones rolled down to bar the way of his energetic progress. In keeping with his character, the energy of which was founded upon unyielding self-confidence, he rejected the propositions made to him, removed those persons who in the slightest degree criticized his measures, and so managed that the wholly natural and inevitable first failures should not be regarded as such, but should be adopted, the result of subsequent experience notwithstanding. Had General v. Stosch quietly acknowledged that he had expended a number of millions experimentally, and that the first results of this expenditure were only to be looked on as experiments and as a method of arriving at a better state of things; had he openly confessed that a few unlucky vessels were failures, no one would have seriously objected to it. An entirely new business cannot be commenced with entirely new material without paying for the experience, and the Treasury was just then in a condition to "pay the piper."

As it was, however, everything was to be looked upon as excellent, and of

course there were people ready enough to think anything originated by the new Minister a success. From this point matters rapidly progressed. As soon as it was determined that our Navy should become independent of foreign countries, not content with affirming that we could construct everything that foreign countries did, we went a step farther and wished to construct what other countries did *not*. New types of war-ships were discovered. Here General v. Stosch met with ungrudging support. All constructors without exception feel the necessity of producing something entirely new and original, and whoever furnishes them with the opportunity of displaying their talents, he is the man for them. Zealous activity soon reigned in the technical branch of the Admiralty. An era of rapid promotion for the younger talents had set in, especially when their seniors, to whom many of the new projects seemed altogether too extraordinary, were one after the other removed. In rapid succession new types appeared: first a flat-bottomed twin-screw gunboat, specially designed for service on the coast of China. This was constructed in Elbing, and arrived in safety as far as Kiel; and there it remains to this day, for after the short experience of the voyage across the Baltic, no one would take the responsibility of steering it across the North Sea, much less to China. Then that monstrosity the so-called armour-plated corvette "Hansa" was built. When completed she neither could use her armament nor manœuvre, either under steam or sail, nor did she attain even approximately her theoretically calculated speed. After she had been repeatedly reconstructed at an expense of nearly 2,000,000 marks (100,000*l*.), she was at length sent on a cruize to the West Indies, and was there when the capture of the German steam-ship "Luxor" by the Peruvians necessitated the despatch of German men-of-war into Peruvian waters. The "Hansa" was ordered to Callao, and took just twice as long getting there as an ordinary merchant steam-ship would have done. Eventually the "Hansa" returned safely to Kiel, and she looks forward to ending her days there, for no one will ever dare venture her against an enemy.

Following on this utterly abortive attempt appeared a new type of armour-plated corvettes, the so-called "sortie corvettes," of which five have been constructed up to the present. We propose considering these farther on, as well as the armour-plated gunboats, commenced about the same time, of which thirteen now exist. We will also remark on the ten torpedo-boats which General v. Stosch left as a legacy to his successor. The sum of the criticisms regarding them may, however, be briefly stated thus, viz., that none of these classes of vessels came up to the expectations formed of them.

The retirement of General v. Stosch cannot be dissociated from these repeated disappointments. Controversies have arisen in regard to these which finally made it unpleasant for the head of the Admiralty to remain in office, and caused him to avail himself of the first favourable opportunity, that of the retirement of General v. Kameke, Minister of War, for withdrawal.

His successor, as is well known, was again a General of infantry. Whether in fact there was no Officer of the Navy to be found who could have filled with credit his important and responsible position, must remain an open question. On the other hand, it will be a matter of great interest to observe how General v. Caprivi sets about the solution of the problem which his predecessor has left him to solve. General v. Caprivi was wholly unknown in the Navy when he was placed at the head of the Admiralty. There was no prejudice against him personally on this account, but the sense of slight which the repeated appointment of an Officer of the land service as head of the Navy unquestionably inflicted upon the Officers of the latter explains its unpopularity, which eventually found expression in the retirement of several Officers of high rank. After first impressions had worn off, there followed a period of curious speculation as to what the newly-appointed Administrator of the Navy would commence with in his unfamiliar office.

In a comparatively short time General v. Caprivi succeeded in making a favourable impression, and this chiefly by doing nothing at all at first. He frankly acknowledged that he as yet knew little of that which, from his official position, it was his business to know, and that he looked to his assistants to supply his deficiencies. An expression of his at that time was, "I am not so stupid as to think that I have no need to ask questions." He, therefore, allowed the arrangements and undertakings of his predecessor quietly to develop themselves, only refraining in the meanwhile from introducing any innovations himself. On the other hand, he caused reports to be made to him on every side of the actual condition of everything as it stood, and then satisfied himself by personal inspection as regards the correctness of these reports. People soon began to comprehend that he saw with the eyes of understanding, and that it did not suffice with him merely to praise the existing state of things. Unlike his predecessor, he took no offence at frank criticism or even remonstrances, but he often disconcerted those who made them by the searching manner in which he required the most detailed exposition of their reasons for such criticism. Everything that appeared to him new was, so to speak, probed to the very bottom, and in this process many a beautiful bubble was burst, and the perfectness of much that was hitherto regarded as a pattern of excellence was seriously called in question.

Now the time of this apprenticeship seems over, and the measures taken and orders issued seem to indicate that General v. Caprivi is "taking his own line." His "line," however, is not that of General v. Stosch, and he does not show the slightest desire to accept without demur the inheritance of his predecessor. The report lately published in the newspapers of the proposals which General v. Caprivi is going to make to the Emperor in regard to the squadron which is to be assembled for training and exercise next year, thereby indicates this. To understand the significance of this measure, we must go back a little in our narrative. We have before alluded to two new types of war ships designed by the Admiralty, which were total failures—the twin-screw gunboat, built in Elbing and intended for service on the coast of China, and the armour-clad corvette "Hansa."

The armament of this vessel is carried broadside. She carries amidships eight guns in two tiers, one above another. Of much greater importance to the German Navy was, however, the construction of the so-called "sortie corvettes," which were intended to play the chief part in offensive coast and harbour defence in the Baltic. Why they are called "corvettes" is not to be discovered, for they exceed the whole of the existing armour-plated frigates, with the single exception of the "Kaiser Wilhelm," in size, in thickness of armour-plating, and in weight of armament.

In their construction the following requirements were to be met :—1. Moderately light draught, so that the vessels when fully armed and equipped for war might be able to run into any of the principal harbours along the Prussian seaboard on the Baltic—Pillau, Danzic, and Swinemunde. 2. Great defensive power; therefore heavy armour-plating and armament were necessary. 3. Great offensive power in order that they might engage any hostile armour-clad squadron in the Baltic. At the same time the vessels were to be under-rigged and of moderate coal-carrying capacity, as they could in case of necessity easily replenish their supply in the above-named harbours. As a consequence of this original programme, in the carrying out of which several modifications were introduced, we have now vessels which, in consequence of their flat bottoms and of their being under-masted, roll so frightfully at sea, that it is out of the question to expect anything like accuracy from their heavy guns.

As regards speed, also, they leave much to be desired, they can only manœuvre when under full steam, and that but indifferently, while they still have such a heavy draught that the idea of their running into the harbours

on the coast seems highly problematical. When these peculiarities showed themselves in the first ship of this type that was completed, certain modifications in the construction of the others of the class were attempted, with the further result that now individual ships of the same class differ considerably from one another even in these peculiarities, which render their employment as a squadron much more difficult. After four of these "sortie corvettes" had been built, they began, even under General v. Stosch's administration, to doubt the excellence of this improvised type of vessel, and a fifth vessel of the class, but of reduced size and less steam-power, was commenced. This vessel is not yet completed, so we cannot say how it will turn out.

Under the administration of the former head of the Admiralty the attempt had never been made to try one or several of these so-called "sortie corvettes" with other armoured vessels, though they were to be, as already mentioned, the *backbone of the offensive and defensive* of the German coasts in the case of a war in the Baltic. We can only form our own opinion as to why this was so. General v. Caprivi, however, correctly indicated this blot of insecurity, and intends, therefore, to have the sea-going training squadron composed chiefly or, at all events, with a large proportion of this class of corvettes. Let us hope the result may be satisfactory to him.

Beside these armour-clad "sortie corvettes," the former administration of the Navy presented us with another type of armour-clad vessels, of which we now possess thirteen, and not one other nation has as yet showed the slightest indication of an intention to imitate us herein.

Armour-clad Gunboats.

It is not a question here of small vessels, but of ships of more than 1,100 tons displacement, each of which carries one gun of powerful calibre forward, protected by a semicircular iron shield or mantle. Each vessel has cost 1,000,000 marks (about 50,000*l*.). These gunboats are to defend the mouths of rivers and entrances to harbours, and the fact of their being armed with guns of the heaviest calibre seems to indicate an intention of employing them against ironclad vessels, and to look upon them to a certain extent as floating batteries. Regarded in this light, however, what we have said above in respect to the "sortie corvettes" applies still more forcibly to them. When there is the least sea on, they roll and pitch to such a degree that only chance hits from their guns could be reckoned upon, and directly a heavier sea gets up they are obliged to withdraw into smooth water. Besides this their speed is so slight that they cannot possibly risk an encounter with larger hostile vessels, for they would inevitably, in case of retreat, be overtaken and cut off. They could, therefore, be only employed with advantage in perfectly calm weather and in immediate reach of the coast, or at the entrance of harbours, or in the harbour roads, and for this purpose coast batteries, supplemented by torpedoes, would be more efficient at a considerably less outlay.

No wonder then that foreign Powers have hitherto not imitated this type of construction! Moreover, after a dozen of these newly-invented gunboats had been completed, even our Admiralty was convinced that a costly failure had been committed. Thereupon two more vessels of this class were placed upon the stocks, of which the dimensions were reduced by a fifth, while at the same time their steam power was increased nearly two-fold. It is presumed these two new armour-clad gunboats will possess greater speed than their predecessors. On the other hand, one can only hope, in their case also, for a steady gun platform, so their offensive power is but moderate. General v. Caprivi has now arranged for a searching trial of these armoured gunboats, at first, singly, and afterwards in squadron, at which it is not improbable that they will attempt to manœuvre them united with the larger

ironclads in close proximity to the coast in order to see what assistance our offensive fleet could derive from these gunboats. According to the universal opinion of those who have had experience of them, they will be utterly useless beyond cannon range of the coast.

This, however, does not exhaust the list of the questionable acts of the late administration of the Navy. When we say that the German Navy possesses no corvette which can make more than 14 knots and no torpedo-boat more than 16 knots an hour, we have said enough, especially when we consider that not only Russia and England, but even Denmark, has constructed torpedo-boats with a speed of at least 20 knots an hour. General v. Caprivi laid his finger on this blot too, and well-informed correspondents gave out that the Admiralty intended to order in England a torpedo-boat which should afterwards serve as a pattern for others to be constructed in Germany. We are informed, however, that this intention, if it ever existed, has been abandoned, for some German shipbuilding firms have undertaken to construct similar torpedo-vessels with a minimum speed of 20 knots.

We may fairly take the opportunity of adding a word in regard to the relations between the constructing department of the Navy and the private shipbuilding firms in Germany. Firm belief in their infallibility had taken root in the breasts of the German officials. This was carried to such an extent that, when the construction of ships was handed over to private firms, as was repeatedly the case, the constructing superintendents of the latter could only act as automatic machines in carrying out the Admiralty plans, the most rigid adherence to their designs even in the minutest details being insisted upon. The constructors of the Admiralty evidently started with the idea that in the whole of the German shipbuilding and civil engineering community, outside the official ring, not one was to be found who could possibly bring forward any design better, or even so good as theirs. Had the Admiralty confined themselves to giving out to private shipbuilders the kind of vessel they wanted, and their requirements as regards speed, strength, and other necessary qualifications, and then left some scope for the genius of the designer, the rivalry between the shipbuilding firms would have certainly caused each to do their best, and possibly considerable progress would have been made.

As it was, however, a series of repetitions of the same mistakes were made, and German shipbuilding enterprise lost the incitement which the prospect of work for the German Navy would have created. It is to be hoped that the inquiries now set on foot by General v. Caprivi will institute a reform here also, and that departmental bureaucracy in the German Navy, too all-powerful notwithstanding its recent creation, may be put an end to, as well as the blind worship of everything that emanates from "superior authority." Of General v. Caprivi, however, we can truly say that he entered upon the inheritance of General v. Stosch only *cum beneficio*.

A STUDY OF A NEW METHOD OF FIRING-PRACTICE AT A MOVING TARGET.

By Lieutenant-de-Vaisseau H. Dutheil de la Rochere, translated from the "Revue Maritime et Coloniale," by H. Dowrish Drake, Lieutenant Royal Marine Artillery.

Shooting at a moving target becoming more and more the general condition of actual warfare, proportionately as the speeds of vessels increase and meetings in opposite directions tend to multiply by the use of the ram, it has appeared to us advisable to examine the conditions under which this fire takes place during an action, and whether the rapid laying which it necessitates is sufficiently inculcated in the Nos. 1 by the drills actually in force. Believing that we are able, as a result of this examination, to establish the insufficiency of the means employed to give the gunners this indispensable amount of instruction, we have endeavoured to remedy it by the method which we shall propound below, and which will be the principal object of this essay.

Observations on Fire in Action.—At the moment when two ships moving at fighting speed (which we will estimate at 10 knots) will pass one another in opposite directions, after having failed in their attempt at ramming, it is evident that all laying in elevation or direction will become perfectly useless, and that it will be moreover impossible, seeing the short time during which the two adversaries will have their guns reciprocally bearing (nine seconds for a firing arc (*champ de tir*) of 50° at a distance of 100 mètres). There would, therefore, be an advantage in laying the guns on the beam beforehand and making the guns' crews lie down, the Nos. 1 alone remaining standing ready to deliver their fire as soon as the enemy passes their line of sight, or prepared to fire a broadside according to the orders given.

This extreme case excepted, laying will rapidly become useful proportionately as the distance at which the ships pass increases, especially if it is desired to strike a particular part of the hostile ship or of the fort before which the gunners may have to pass, and this laying will become so much the more quickly practicable as the Nos. 1 are better drilled in laying in the least time possible.

These considerations have compelled, among other nations as well as in France, a study of different practical means which allow of drilling the gunners in this rapid laying at a moving target. It does not come within the province of this essay to examine severally all the systems which have been proposed. We will limit ourselves to describing briefly those which we have seen most frequently essayed ; and after having pointed out their faults, we will proceed to the explanation of the method which we propose.

Summary Examination of some of the Processes.—The most common of the processes employed consists in causing a target, towed by a steam-launch with a scope of 100 mètres, to cross the firing arc of a ship at anchor at a speed of from 5 to 6 knots.

Now it is easy to calculate, by the annexed table, that if the launch crosses at a distance of 500 mètres, the target remains 2′ 32·5″ in a firing arc of 50°, which is evidently too much.

Table giving the Times occupied by a Ship in crossing a Firing Arc of 50° at various Speeds and Distances.

Speed of ship.	Distance in mètres.									
	100	200	300	400	500	600	700	800	900	1,000
	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
6 knots	0 30·5	1 1	1 31·5	2 2	2 32·5	3 3	3 33·5	4 4	4 34·5	5 5
8 „	0 22·5	0 45	1 7·5	1 30	1 52·5	2 15	2 37·5	3 0	3 22·5	3 45
10 „	0 18	0 36	0 54	1 12	1 30	1 48	2 6	2 24	2 42	3 0
12 „	0 15	0 30	0 45	1 0	1 15	1 30	1 45	2 0	2 15	2 30
14 „	0 13	0 26	0 39	0 52	1 5	1 18	1 31	1 44	1 57	2 10
16 „	0 11·5	0 23	0 34·5	0 46	0 57·5	1 9	1 20·5	1 32	1 43·5	1 55
18 „	0 10	0 20	0 30	0 40	0 50	1 0	1 10	1 20	1 30	1 40
20 „	0 9	0 18	0 27	0 36	0 45	0 54	1 3	1 12	1 21	1 30
22 „	0 8	0 16	0 24	0 32	0 40	0 48	0 56	1 4	1 12	1 20
24 „	0 7·5	0 15	0 22·5	0 30	0 37·5	0 45	0 52·5	1 0	1 7·5	1 15

If the ship herself should move in the opposite direction to the launch at a speed of 10 knots, the target, under the same conditions, would only remain 57·5″ in the firing arc, but, apart from the fact that this figure appears to us still too high, we have come to the conclusion that the chances of accident become such that one is promptly obliged to give up this solution of the problem.

Two ships, each firing reciprocally at a target towed by the other, would perform undoubtedly the practice which would fulfil the required conditions in the best possible manner, but the danger would be still further increased, and the expenditure of coal would become too great; in fine, this practice, which would require two ships to carry it out, could not become a very frequent custom.

In order to obviate the different drawbacks which we have just pointed out, several Officers have had the idea of firing from a stationary ship at a stationary target, obtaining the representation of the movement of the target relatively to the line of sight, by a displacement of the line of sight itself produced at will by the instructor during the laying; angular displacement of which it is easy to vary the rapidity. The first proposal of this nature—to appear and be put in execution—was presented by Lieutenant-de-Vaisseau Arago, and developed in a certain number of lectures delivered to the Officers by the originator under the presidency of the Commandant of the School of Gunnery. (See the Appendix of the progress of aiming drill in use on board the gunnery ship.)

Its theory is very simple and very exact; the practice made with it daily on board the training-ship gives excellent results.

We think, however, that the results obtained with this arrangement would be better still if this simple line of sight were replaced, with some slight modification of detail, by a rifle-barrel, mounted on gimbals, because the point of impact of the ball indicating at each shot the exactness of the laying, the drill would become more interesting and more comprehensible to the men, and even to some instructors. One can see also that one could, without very great difficulty, apply this principle of relative movements to one of the 10-cm. or 14-cm. guns on board, but the advantage of this small improvement would be very little in comparison with the expense which it would necessi-

tate. Again, this method of drill would still present the great inconvenience of not placing the ship in the conditions which she would often meet in ordinary firing, or on the day of battle.

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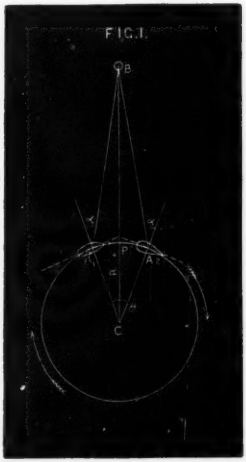
The result which we are striving to obtain is to accustom the gunners to fire at a target moving very rapidly in the firing arc, and consequently only remaining there for a very limited number of seconds (which number one could at the same time modify at will), and that the distances of the target remain always within the limits admissible for firing in action, but vary from one moment to another, so as to necessitate, at each shot, a new direction and elevation. It fine, it is necessary that the drill should be of some practical use.

This programme would be carried out if we fire at a stationary target placed outside a circle, along the circumference of which the ship will turn, the whole under certain conditions of distances and speeds which we are about to determine.



One sees, in fact (Fig. 1), that if the ship wishing to carry out the practice turns round a buoy C, in describing a circle of radius R, at a speed V′ knots (V′ being the speed V with which the ship would be moving if she did so in a straight line with the same number of revolutions of the screw, diminished by the resistance of the rudder), she will pass at each turn a point such as A_1, when the target, placed outside the circle, at B for example, will appear to her in extreme bearing on the bow, then it will seem to move from forward aft, in proportion as the vessel turns, to disappear at length at the extreme bearing abaft the beam when the ship will have arrived at A_2.

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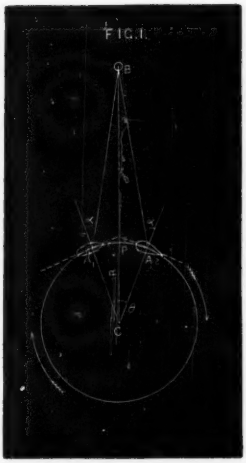

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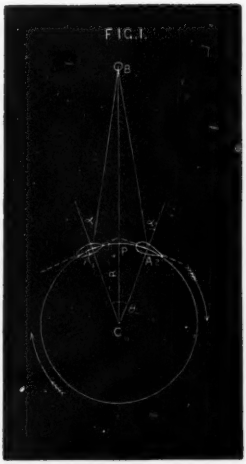

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circle, on the speed with which the circumference is described, and on the distance, BP, at which the target is placed.

Let $2a°$ be the firing arc (*champ de tir*) of the ship, the number of seconds (N_s) which the ship will take in going from A_1 to A_2, that is to say, the number of seconds during which the target will remain visible, will be, calling θ the angle A_1CA_2 at the centre,

$$N_s = \frac{2\pi R \times 3600}{V' \times 1851{\cdot}85} \times \frac{\theta}{360} \text{ (See note.[1])}$$

The first factor of the second number of the above equation represents the number of seconds occupied in turning one complete circle; or

$$N_s = \frac{R\theta}{V'} \times {\cdot}034 \quad \ldots\ldots\ldots (1),$$

and as θ itself depends on the distance BP, since the triangle A_1CB gives us

$$\frac{\theta}{2} = a - A_1BC \quad \ldots\ldots\ldots (2),$$

and

$$\sin A_2BC = \frac{R \sin a}{R + BP} \quad \ldots\ldots\ldots (3),$$

we see that N_s depends only on the variable R, V′ and BP a remaining constant for the ship or gun under consideration. Theoretically, then, we could attribute any values whatever to two of these variables, and from them deduct the third, satisfying the conditions demanded for N_s, whatever be the number of seconds.

But in practice as we only adjust the radius of the circle, and the speed, within certain limits, and so, moreover, these quantities are connected among themselves by the law of gyration of the ship, whilst, on the contrary, the distance of the target is absolutely optional, it will be preferable to fix R and V′ in such a way that the ship can turn a circle easily about a point, and determine, by means of the three preceding equations, the distance at which the target must be moored to obtain the desired value of N_s. With this practical manner of working, we might ask, if the distance at which the calculation indicates the target should be moored will always remain well within the admissible limits of firing in action.

To assure ourselves of this it is sufficient to fix—

(1.) For N_s—the least number of seconds which we consider necessary to rectify the laying in elevation, to train for direction, and to fire with most chance of obtaining as good a result as if we employed broadside firing. Let thirty seconds be the minimum.

(2.) For R—the value of the longest of the radii of the minimum circles which we are sure of being able to describe. Let 300 mètres be the maximum of R; and

(3.) For V′—the least speed to which we can always attain. Let this speed be 6·5 knots.

[1] *Trans. note.*—In the formula $N_s = \frac{2\pi R \times 3600}{V' \times 1851{\cdot}85} \times \frac{\theta}{360}$ the units are French, R being the number of mètres in a knot.

In English units the formula would be—

$$N° = \frac{2\pi R \times \frac{39{\cdot}37}{12} \times 3600}{V' \times 6080{\cdot}7} \times \frac{\theta}{360}$$

The resulting formula (1) of course, the same in both cases.

If with these data, which are the most unfavourable for a sufficient range, we still obtain an admissible value for BP, the question will be solved. But now, if in the formulæ which we have set down, we replace N_s, R, and V′ by the limit values which we have just ascribed to them (30 seconds, 300 mètres, and 6·5 knots), we find 176 mètres to be the value of BP, this distance, at which the target must be moored that it may remain visible only thirty seconds, would be a little small for practice even with a tube-cannon (for at this distance it would be necessary to go 10·5 knots in passing a fort in order to remain only thirty seconds in the firing arc); but we must not forget that this value is absolutely a minimum, which will be easily exceeded by the slightest diminution of R, or by insisting on less rapidity of fire (that is to say, augmenting N_s), or by increasing V′, without causing a sensible increase of R as a result.

The distance of the target will not vary from the moment when the ship will have regulated her turning movements round the point C; if we wish to imitate the variations of the target which crop up in an action, and oblige the Nos. 1 to lay in elevation each time it comes on, we must insist, in the drill, that the laying be disturbed haphazard after each passage of the target through the firing arc. The instructor should pay particular attention to this matter.

This method, which we advanced in an essay dating from the end of 1881, is very simple in theory, as we have just seen: the facility of applying it in practice would still, perhaps, have given rise to some doubt in our mind if the commandant of the School of Gunnery had not kindly authorized a trial of it during practice with tube-cannon, carried out by the ship "Saint-Louis," on the 22nd of March, 1882, in Hyères Roadstead.

We give below the results obtained, annexing, for more complete information, the practical details of carrying it out.

Trials of Tube-cannon Practice at a Moving Target, carried out by experienced Gunners on board the "Saint-Louis," March 22nd, 1882.

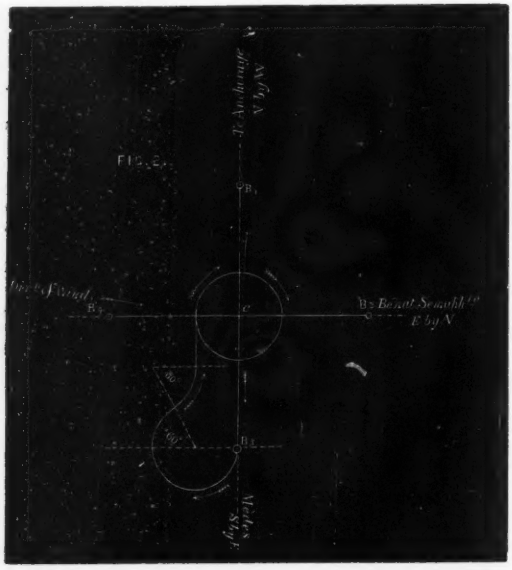
It was proposed to keep the target within a firing arc (*champ-de-tir*) of 50° for 45·3 seconds (the time during which two ships, passing one another at 500 mètres, with a relative speed of 20 knots, could fire at one another), knowing, by former trials of circle-turning made on board the "Saint-Louis," that the ship could describe a circle of 250 mètres radius at a speed of 5·2 knots. Worked out from these data, the calculation indicates that we must moor the target at 300 mètres, or steam at 6·3 knots, if we wish to keep the target during the practice at the distance which it will have in the battle supposed below. It was this distance of 500 mètres that was adopted, hoping that the desired speed might be attained without a very sensible increase of R. It was determined also to do away with too long interruptions in the firing, to moor four targets in place of one, placing them at the angles of a square inscribed in a circle of 750 mètres radius. Under these conditions it was a question of seeing whether we should not encounter too great difficulties in the application of the proposed method.

Accordingly, on the morning of March 22nd, in cloudy weather with westerly wind and calm sea, the "Saint-Louis," towing the steam-launch of the "Souverain," cast off from the moorings at Salins d'Hyères, and laid her course S. by E., her head on the Mèdes, in order to obtain in the roadstead the space necessary for her firing.

The point *c* of her course (Fig. 2) was fixed as the centre of gyration, whence a well-known point on the coast, the Bénat Semaphore, bore on the beam. She moored a first target (B_1) 750 mètres, before arriving at *c*; arrived at this point she moored the buoy which was to serve as a centre.

The steam-launch then cast off the tow-ropes, and headed for the sema-

phore, to moor the second target E. by N., at the distance agreed upon, then the fourth target W. by S. of the point *c*, returning at last near the central buoy to await the "Saint-Louis," on the starboard hand of which she was to remain during the practice which was to take place to port. During this time the ship, continuing her course, moored the third target, and described the curve indicated (Fig. 2), to place herself in a position to turn round the point *c* at a distance of 250 mètres.



Fire was opened at the first target at 8 h. 32 m. We had arrived at the point B_1 at 7 h. 57 m.; these different dispositions had thus occupied only about 35 minutes. As each of the targets passed on the beam we noted carefully from the bridge the hour, as well as the distance from the centre; a signalman at the azimuth-compass aft, wrote down the time of each target on entering and leaving a firing arc of 50°.

We were thus enabled to arrange the two tables (p. 217).

From the first of these two tables we deduce—

Mean time of describing a circle	8 mins. 39 secs.
Mean radius	280·53 mètres.
Whence mean speed	6·59 knots.
And mean times of targets being in firing arc of 50°	45·88 secs.

The second table gives us—

Mean of times of targets being in firing arc of 50°...	46·11 secs.
Mean of means	45·99 „
Or say	46 „

On referring to the first table, on page 212, we see that this mean number of 46 seconds, which we have found as the time the target remains in the firing arc, represents, in two ships crossing at 500 mètres, a relative speed of the two adversaries equal to 19·6 knots.

Table of the Times of the Targets passing on the Beam and corresponding Distances of the Centre.

Target 1.		Target 2.		Target 3.		Target 4.	
Hour.	Dist.	Hour.	Dist.	Hour.	Dist.	Hour.	Dist.
h. m. s.	mètres.	h. m. s.	mètres.	h. m. s.	mètres.	h. m. s.	mètres.
8 32 8	258	8 34 5	268	8 36 10	272	8 38 31	300
8 40 35	290	8 42 36	250	8 44 40	273	8 46 55	290
8 48 55	227	8 50 55	303	8 53 0	317	8 55 18	280
8 57 20	245	8 59 30	330	9 2 0	357	9 3 10	200
9 5 14	260	9 8 26	382	9 10 45	355	9 13 21	210
9 15 24	307	9 17 42	308	9 19 56	230	9 22 14	308
9 24 22	307	9 26 30	251	9 28 27	239	9 30 29	257
9 32 28	290						

Table of the Times of each Target remaining in a Firing Arc of 50°.

Target 1.			Target 2.			Target 3.			Target 4.		
Time of entry.	Time of leaving.	Difference.	Time of entry.	Time of leaving.	Difference.	Time of entry.	Time of Leaving.	Difference.	Time of entry.	Time of leaving.	Difference.
h. m. s.	h. m. s.	s.	h. m. s.	h. m. s.	s.	h. m. s.	h. m. s.	s.	h. m. s.	h. m. s.	s.
...	...	...	8 33 43	8 34 27	44	8 36 48	8 37 33	45	8 38 8	8 38 54	46
8 40 12	8 40 57	45	8 42 14	8 42 59	45	8 44 17	8 45 3	46	8 46 33	8 47 19	46
8 48 33	8 49 17	44	8 50 31	8 51 19	48	8 52 36	8 53 24	48	8 54 56	8 55 41	45
8 56 58	8 57 42	44	8 59 5	8 59 54	49	9 1 36	9 2 25	49	9 2 48	9 3 32	44
9 4 51	9 5 38	47	9 8 1	9 8 51	50	9 10 20	9 11 9	49	9 13 0	9 13 44	44
9 15 0	9 15 48	48	9 17 19	9 18 5	46	9 19 34	9 20 19	45	9 21 50	9 22 38	48
9 23 59	9 24 45	46	9 26 7	9 26 52	45	9 28 5	9 28 49	44	9 30 6	9 30 51	45
9 32 5	9 32 51	46									

Conclusion.

This result, although not obtained, we venture to say, without a certain strain on the afterpart of the ship, on account of the great angles of helm which we had sometimes to employ, appears to us conclusive.

It seems to us that the proposed method would permit real practice to be carried out at sea, under all the conditions of speeds and distances which would probably crop up in an action, and that without more expense or chance of accidents than when carrying out ordinary practice under steam.

In a word, we believe it very useful as an improvement in the instruction of gunners in practice, that is to say, in that which is above all essential for these men, and it is to this end that we present it.

Note.—We annex some complementary information on the aforesaid firing, as an example and type of the calculations in which the application of the method might be employed on any ship whatever, the "Trident" for example.

Supplementary Information on the Firing Trials of March 22nd, 1882.

The tubes were mounted—

On deck—In a 27-cm. gun, in one of 19-cm., and in two of 14-cm.

In the battery—In two 24-cm. guns, and one of 19-cm.

Four shots were fired by an experienced gunner.

Time of commencing firing.....	8 h. 32 m.
Time of ceasing firing.....	9 h. 38 m.

Results of the Firing.

	14-cm. gun.	Heavy calibre.
Number of shots fired.....	112	 144
Mean time of firing a round.....	1 m. 3 s.	..... 1 m. 56 s.

The shots appeared generally good with the socket of the tangent-sight of the tube-cannon set for 500 mètres, and the sliding leaf varying from 2 millims. to 14 millims. left, the ship firing to port. Take approximately 1·2 millims. per knot of speed of the ship and ·9 for a wind of 1 mètre perpendicular to the plane of sight.

Example and Specimen of Calculation.

The "Trident," for which we assume, from the "Aide-Mémoire of Naval Artillery"—

Diameter of circle of gyration	444 mètres.
Angle of training before the beam of two 14-cm. guns on each broadside placed in the battery before the citadel	20°
Angle of training abaft the beam of these guns.....	30°
Say, without appreciable error.....	$\alpha = 25°$

wished to exercise her Nos. 1 in firing at a target crossing the firing arc in forty-five seconds, the condition of two ships passing one another at 500 mètres distance at a relative speed of 20 knots.

It was considered that she could be easily kept in a circle of 300 mètres radius, preserving at the same time a speed of from 6 to 8 knots, 7 knots for example. At what distance should the target be moored? Or, on the other hand, wishing to fire at a target placed at 500 mètres, as in the supposed action, at what speed should the ship describe a circle of 300 mètres radius?

In the following formula we shall call ω the angle A_1BC of Fig. 1, and D the distance BP at which the target will be moored.

First Case required, the Distance D.

Data.	Formulæ.	
	General.	To be used.
$N_s = 45$ secs. $\alpha = 25°$ R = 300 mèt. $V^1 = 7$ knots.	$N_s = \frac{R\theta}{V'} \times \cdot 034$ $\frac{\theta}{2} = \alpha - \omega$ $\sin \omega = \frac{R \sin \alpha}{R + D}$	$\theta = \frac{N_s V'}{R \times \cdot 034}$ $\omega = \alpha - \frac{\theta}{2}$ $R + D = \frac{R \sin \alpha}{\sin \omega}$ Whence D thus—

$$\log \theta = \log N_s + \log V' - (\log R + \log \cdot 034)$$
$$= 1\cdot 653213 + \cdot 845098 - (2\cdot 47712 + \bar{2}\cdot 531479)$$
$$= 2\cdot 498311 - 1\cdot 0086 = 1\cdot 489711 = \log 30\cdot 86$$
$$\therefore \theta = 30\cdot 86 \text{ degrees.}$$

$$\text{and } \omega = \alpha - \frac{\theta}{2} = 25^\circ - 15\cdot 43^\circ = 9\cdot 57^\circ = 9^\circ\ 34'\ 12''$$

$$\log (R+D) = \log R + L\sin\alpha - L\sin\omega$$
$$= 2\cdot 477121 + 9\cdot 625948 - 9\cdot 220765 = 2\cdot 882304$$
$$= \log 763 \text{ nearly.}$$
$$\therefore R + D = 300 + D = 763$$
$$\therefore D = 463 \text{ mètres.}$$

The distance at which the target should be moored to fulfil the required conditions.

Second Case required, the Speed V'.

Data.	Formulæ.	
	General.	To be used.
$N_s = 54$ secs.	$N_s = \frac{R\theta}{V'} \cdot 034$	$\sin\omega = \frac{R\sin\alpha}{R+D}$
$\alpha = 25^\circ$	$\frac{\theta}{2} = \alpha - \omega$	$\theta = 2(\alpha - \omega)$
$R = 300$ mèt.	$\sin\omega = \frac{R\sin\alpha}{R+D}$	$V' = \frac{R\theta}{N_s} \cdot 034$
$D = 500$ mèt.		Whence V' thus—

$$L\sin\omega = \log 300 + L\sin 25^\circ - \log (300+500)$$
$$= 2\cdot 477121 + 9\cdot 625948 - 2\cdot 90309$$
$$= 9\cdot 199979 = L\sin 9^\circ\ 7'\ 7''$$
$$\therefore \omega = 9^\circ\ 7'\ 7''$$
$$\text{and } \theta = 2(\alpha - \omega) = 2(25^\circ - 9^\circ\ 7'\ 7'') = 2(15^\circ\ 52'\ 53'')$$
$$= 31^\circ\ 45'\ 46'' = 31\cdot 76^\circ$$
$$\log V' = \log R + \log\theta + \log \cdot 034 - 45$$
$$= 2\cdot 477121 + 1\cdot 501880 + \bar{2}\cdot 531479 - 1\cdot 653213$$
$$= \cdot 857267 = \log 7\cdot 2 \text{ nearly.}$$
$$\therefore V' = 7\cdot 2 \text{ knots.}$$

The speed at which the ship must go to fulfil the required conditions.

THE RECRUIT.[1]

A short Introduction to the Training of the Infantry Soldier up to his being put into the ranks. By KOEPPEL, Captain and Company-Chief in the 4th Upper Schleswig Regiment of Infantry, No. 63. Revised in accordance with the latest Regulations. Berlin, 1883. Ernst Siegfried Mittler and Son. Pamph. Price 6*d*. Translated by permission of the author, by Lieut.-Col. H. Helsham Jones, of the Royal Engineers.

Introductory Considerations.

EVERY company of infantry has on an average about fifty recruits annually assigned to it. When there is an ample supply of instructors I consider it advisable to employ four corporals (*Unteroffiziere*) and four lance-corporals (*Gefreite*) to train these recruits, and accordingly to form the men into four detachments.

Each of these detachments forms a corporal's[2] charge, and, when circumstances permit, is with its instructors in the same barrack room.

The three-rank formation, prescribed in § 15 of the Drill Book for the squad, is in nowise interfered with or made more difficult by this distribution of the men into four detachments for detailed training. On the contrary, it is the natural formation for extended fighting, and affords, in consequence of the small number of recruits which are assigned to a single corporal, the advantage of a more thorough detailed education of the individual man, and this is and will always be the chief thing to aim at.

With large detachments of seventeen men it will soon be found that the corporal, thinking he can make progress in no other way, begins to work wholesale. It is needless to point out how disadvantageous is such a method, and that the injurious effects on the position and marching of the men can never afterwards be made good.

For school exercises the squad is always formed in three ranks, sized in the regulation way; otherwise every corporal gets indifferently bigger and smaller men, and, when the supply of recruits is partly Polish, Germans and Poles in due proportion. This distribution seems to me, apart from reasons of fairness, to be advantageous, because the non-commissioned officer often fancies that the bigger men who are assigned to another get into shape more speedily than the smaller who are attached to himself, and *vice versâ*. Where there are Polish recruits the corporal, or the lance-corporal, must be master of the Polish language.

In the first weeks, and for practising the manual exercise, several assistant instructors may be advantageously employed, in addition to the permanent instructors.

I have assumed twelve weeks as the whole period of training, and divided the exercises by weeks progressively from the easier to the more

[1] "Der Rekrut." Kurze Anleitung zur Ausbildung des Infanteristen bis zur Einstellung in die Kompagnie von Koeppel, Hauptmann und Kompagniechef im 4. Oberschlesischen Infanterie-Regiment, Nr. 63. Berlin, 1883: Mittler u. Sohn.

[2] Unteroffizier is rendered corporal throughout. The table of ranks in "Weisshun's Manual" (p. 14) shows that the term, besides applying generally to non-commissioned officers, has a meaning as a special rank next below sergeant. See also table of pay at p. 27 of "Instruktions-Buch, für den Infanterie-Unteroffizier."—TR.

difficult. If in some cases one or two weeks more should be available, this time is to be utilized for making sure of what has been learned and obtaining greater precision, but it is not indispensable. But I consider it desirable that the Company-Chief should be informed beforehand how much time is at his command for training his recruits, so that he can divide the work methodically and thus save time.

Four to four and a half hours daily suffice for all the branches of instruction except the theoretical, which requires an additional hour. Considering the time of year in which we train our recruits,[1] the best hours for practical exercises seem to me to be from 8.30 to 11 A.M., and from 2 to 4 P.M. (or 2.30 to 4.30).

Opinions differ so much as to the best time of day for theoretical instruction, that it is worth while to say a few words about it. As extremes I have known some recommend 6 to 7 in the morning, others 7 to 8 in the evening; others, again, as golden mean, a familiar short afternoon hour whilst the potatoes were peeled. The night enthusiasts, namely, those who have their instruction from 6 to 7 A.M. in December, are full of praise of the fresh cheerful spirit which both teacher and learner are said to show in these morning hours. I do not know, but it has always seemed to me that all present at this time in winter were scarcely yet fairly awake. The reasons which weighed with the potato-peelers and the evening instructors must have been simply personal, for these wonderful fanatics cannot have expected any advantage for the business in hand.

There remains as the best time the hours from 7 to 8 A.M., and 5 to 6 P.M., which of the two is preferable I will leave undecided. I myself have lectured preferably towards evening, and never found that the men were too tired from the previous drill to be able to follow my lecture intelligently; this weariness mostly comes on only when the instruction is carried on in a soporific manner.

As a good and cheap instruction-book I recommend that of Weisshun. It is referred to in the weekly time tables.

In the first six weeks there must also be a daily cleaning hour, during which the mode of cleaning the rifle, materials for cleaning, dismounting and mounting the lock, names of the different parts of the arm, are gone through.

A more thorough attention ought to be given to this object than is usual; the recruit learns to polish his buttons very well, but the care of his rifle is with him only a secondary matter, because he does not receive a correct and careful instruction in it. Instead of only keeping it clean he polishes his weapon, and so successfully that he rubs all the browning off. For the preservation of the rifle there are, therefore, stringent orders not to give it to the men till they are thoroughly instructed how to handle it, and of course the cleaning is always done under supervision. I have caused the rifle of the lance-corporal to be used for the cleaning instruction of each detachment; out of interest in his own weapon he will take care it is not injured.

Once or twice a week, instead of this cleaning hour, there may be an hour for mending (*Flickstunde*).

For the men who speak only Polish there must be all through the training time and after it an hour daily for instruction in the use of the German language, which at first can be combined with the cleaning or mending hour. But this hour should not, as often happens if left to the non-commissioned officers, be seized on merely as a second lecture hour, in which the men at last only say over the answers they have learned by heart to a certain set of questions without the slightest understanding of what they mean; but there must be a real instruction in German, somewhat in the following manner—the men first learn the German names for the things which they have on and

[1] November, December, and January.—TR.

around them, for the objects in the room and on the parade ; then they must form short questions, and give similar simple answers to them, all in a practical manner, until by repeated practice they at last come to express themselves correctly.

To sum up—

7—8 A.M., cleaning or mending, with German for the Poles.
8.30—11 A.M., practical work.
2—4 P.M., " "
5—6 P.M., lecture.

The duration of the particular branches of drill would be in the latter weeks as follows :—One hour in the morning squad drill in single rank, half an hour individually, half an hour in ranks, half an hour in sentry and guard duty. Aiming and judging distance drill, firing with aiming ammunition (*Zielmunition*), with ball and blank cartridge, must be carried on during the same time. In the afternoon one hour and a half of gymnastics and bayonet drill, half an hour of skirmishing by bugle sound.

Any pause in the morning drill is, considering the shortness of its duration, quite superfluous. Even in drills of longer duration I have never been able to advocate such pauses, for they generally fail of their object. When the drill comes to be carried on in any place not immediately adjoining the barracks, the men never know what to be at. One exposes them needlessly to the inclemency of the weather for fifteen minutes or half an hour more, even if one is not of the opinion that standing about on the drill ground *off* duty is not much the same as doing so *on* duty. The detail drill offers ample opportunity for each man to rest and regain his energies.

The special daily time-table for the different branches of duty and individual exercises results partly from the tasks which are laid down further on for every week, and partly must be arranged in detail by the Officer in charge according to results obtained. Of course it need not be said that the detailed instruction of the man in marching, and in the manual and firing exercises, requires more time than learning the turns, closing paces, and compliments.

A point on which I lay great stress, in order to excite to the utmost the interest of the instructors and instructed, is the frequent change of the objects of the exercise, which is always within the power of the Officer in charge. Section 13 of the "Reglement" is very clear on this subject.[1]

But it is not only that the attention of the men is exhausted by too sustained an occupation on one and the same thing, but also the equal development of the individual muscles, and therewith the thorough systematic training of the whole body, suffers more harm than can afterwards be made good again by the Freiübungen.[2] For instance, it is decidedly wrong after too long a halt to expect the men immediately to march lightly and freely with their stiffened limbs without having interpolated a sufficient series of Freiübungen. And yet this is what one constantly sees ! A further

[1] § 13. In training soldiers, both individually and in a squad, their energies are never to be overtaxed, and the necessary changes in the objects of the exercise must be made, so that their attention may not be exhausted by being kept too long over one and the same thing.

This principle is specially applicable to recruits ; therefore, so soon as the foundation of their training has been duly laid in accordance with the rules of paragraphs 1 to 9, and especially the rudiments of the firing exercises have been taught and understood, even with them, for the sake of variety, the extended order of fighting must be begun, and that not only formally but also in connection with the utilization of ground. With the same object of variety, gymnastics and aiming practice are to be interwoven with ordinary drill.

[2] See page 224.

advantage of the frequent change of exercise *at the command of the Officer* I find in the fact that the non-commissioned officers cannot needlessly occupy themselves with individual men and one particular practice; the training of all the rank and file progresses more equally when choice of the exercises and the time to be given to them are not left to the fancy of the instructors. If the non-commissioned officers know that an exercise which has been ordered will soon give way to another, they will, in order to get through it with all the men of a rank, be careful of their time, will occupy themselves less with the handy and assiduous men, and more with the awkward and indolent. The training of recruits is, under proper instruction on the part of the Officers, the best school for our young non-commissioned officers; they very soon feel the weak points in their own knowledge and capacity, and exert themselves zealously to make good what is still deficient in acquirements and experience.

It is understood that all exercises which for ease of instruction are divided by numbers are to be practised in that way so long as the object in view requires it.

The Freiübungen form the foundation of the physical education of the soldier, as well in drill as in gymnastics, they are, therefore, to be practised from the beginning of the soldier's training, and in the early weeks almost exclusively. Every man is individually instructed. During preliminary explanations on the correct positions of the body and form of the motions, the other men with whom the instructor is not at the moment specially occupied should practise independently and mutually watch one another (§ 3 of the Regulations for Infantry Gymnastics).

In the second week the Gewehrübungen[1] are begun, which serve as preliminary to the manual and to the aiming drills, and at the end of the fortnight the apparatus exercises (*Rüstübungen*),[2] which specially aim at the development of the soldier's muscular power and address.

The exercises for recruits are precisely laid down in § 35[3] of the Gymnastic Instruction; if, however, the exercises are diligently practised, and no objection is made, it is advisable to add to them the easier exercises out of the schedule for the third gymnastic class. The more active men can be easily brought on so far that they carry out the practice on the horizontal bar (*Querbaum*) preliminary to mounting on it.

The reasons for pushing them on are that the half of the year's batch of recruits is allowed to go to reserve (*zur Disposition*) after scarcely two years' service, the clumsy, the lazy, the men who haunt the cells and hospital, are left behind; anyone who at all qualifies in the third year is, in all commands, sooner or later withdrawn from the service; as a general rule it comes to this, that the great majority of men must get through what is laid down in the regulations in the way of apparatus exercises in somewhat under two years. Moreover, in every fortress all the older soldiers are so much in request for guard and fatigue duty during the winter months, that progress in gymnastics is out of the question; indeed, it becomes a matter for congratulation if we do not absolutely stand still and consequently go back.[4] In other garrisons, again, it often happens that by reason of want of space (the available space being scarce enough for the recruits), gymnastics can in winter only be practised very rarely. For all these reasons I think it only practical to get on as much as possible with the apparatus exercises during the recruit period. There is time enough, and there can be no disadvantage so long as the

[1] See page 230.
[2] See page 230.
[3] § 35. Table of exercises for recruits and the three gymnastic classes.
[4] "Stillstand ist Rückschritt." Compare Prince Frederic Charles, preface to Militärische Denkschrift.

instruction goes on carefully and methodically. Those recruits will drill best who do most gymnastics.

The bayonet exercise begins as soon as the Freiübungen have been so far practised that they no longer demand too much time for repetition, that is probably in the seventh week. §§ 7 to 11 of the Regulation for Bayonet Exercise for Infantry are to be practised.

Drill.—Simultaneously with the Freiübungen the practices in drill conformable with them which are contained in the first chapter of the Reglement are begun, that is position, turnings from the halt, and closing.

Marching is not yet practised. To warm up the men and make them handy, I recommend walking in single rank, of course beginning without keeping step and with intervals and simple forming up (in line, and by files to right or left in front).

All needless running is to be most strictly forbidden. In cold and stormy weather it only too easily lays the foundation of lung-disease, and in warm weather wastes the strength and time of the men in the most useless manner. It is a favourite hobby of the non-commissioned officers to send their men racing in wild confusion from one end of the parade to the other to see who can get in first, and to repeat this senseless chase till all are out of breath. Finally they reform the rank, and, before the men have come round, turn about like a teetotum to every point of heaven till at last the whole squad is mixed up in a confused tangle. This is said to make the recruits handy! Everyone has himself learned in this way, and so he teaches, and so this nonsense is handed on from generation to generation, like the classic balance step, which is uncommonly tenacious of life. If for no other reason, such exercises should never be tolerated for the sake of health. As further objects for practice in this period, I would cite individual dressing by files, dressing back, and, lastly, the compliments without arms. The last, on account of their being required when walking out, are to be practised with special care, simultaneously with verbal instruction, as soon as the men have seen the Officers concerned. This they will be able to do when taking the oath of allegiance.

The rifle is put into the hands of the recruit in the fourth week, but only very gradually and in combination with the practice of the manual, so as not to spoil the men's position. The "slope," "trail," and "order" must be taught first, as they are constantly required. (See Reglement, pp. 12, 13, and 14.) Marching is also begun in the fourth week, and that precisely as laid down in § 3 of the Reglement.

Slow march, and its barbarous cousin, the balance step, are unknown to the Reglement, as appears from the words: "As soon as the left foot is set down flat, the right heel quits the ground (§ 6). Out of this, and the regulation 112 paces a minute, how can anyone make a slow march? In spite of this the slow march still lords it almost unopposed over the whole of the infantry and the special arms, and there are still many who think it the great secret of our success. It is only quite recently that I saw the wonderful sight of the men of a battery, whilst the horses were being exercised, practising the slow march in single rank. How nice it would have been if only the horses too could have done the balance step by numbers! The reasons adduced by its adherents for retaining the slow march are that it is the only preliminary practice for the quick march, it is only by it that the men learn to balance the body, to brace the knee, to keep the toes down and the upper part of the body forward, and to take a full pace. Moreover, they say, it is of the highest value for discipline, and indispensable for the extra drill of the idlers.

But what is the fact? Have we really no other and simpler means? That would be lamentable. The natural and only rational prelude to marching is found in the Freiübungen, and especially in rolling the foot,

lifting the leg, bending and straightening the knee from the first position.

As for its effect as a means of punishment one can take just as tight a hold of the men in any practice as one likes, and that always with the knowledge that they are learning something.

How much time it takes to acquire the slow pace! How much trouble it gives the instructors! And when at last the object is attained, the transition to the quick pace, the actual marching pace, requires almost as much time. I, therefore, can only advise those who, even after the recruit's course, prelude every drill with the slow march, to try once without it, and to employ the time so gained in exercises on ground (*im Terrain*).

After a three-weeks diligent practice of foot and leg movements the recruit learns in a short time to march easily. At first they are allowed to move quite naturally and without constraint, and only a free pace is insisted on, the knees are somewhat braced, and the points of the toes kept down. Gradually the pace is made longer and freer, and before the recruits are aware of it the regulation march has been acquired. In the sixth week marching with arms may be begun. This again will make the pace more difficult to maintain, and there will be a tendency to drag. It is, therefore, well to march frequently without arms, by way of change, until the men are used to bearing arms. All recruits, in their efforts to do right, fatigue themselves far too much in marching.

The object of marching is to get over ground with the utmost economy of strength. One cannot, therefore, insist too much on marching easily.

In the practice of the firing exercise by numbers, it is constantly the habit to split up the drill into an excessive number of individual motions. This needlessly adds to the difficulties of the men, because it takes time for them to learn to keep the numbers distinct. The three numbers detailed in § 7, paragraph 2 of the Reglement are fully sufficient if it is considered necessary, with blank cartridge, to practise loading by numbers.

When the recruits are so far advanced that the manual exercise and marching are practised daily in single rank, they must still to the last day of their training be exercised individually, in order to remove the faults which one or another has picked up during drill in rank. Very special attention is in this latter period to be directed to the position of the soldier. Squad drill is carried on in the last two weeks. One hour should suffice.

Great attention must be paid to dressing. The Officer must by thorough teaching make sure that the principles of dressing (§ 18 of the Reglement) become engrained in the non-commissioned officers and men. I recommend as a useful exercise that every time the men stand at ease, even when in ranks, the right-hand man should, without any word of command, give a new dressing line (alignment) by advancing or changing his front. For the rest the training in squad extends over the early parts of the company instruction.

Aiming and judging distance drills are to be begun with the first hour of the soldier's service. If the recruits are told off into four squads, the non-commissioned officer of each squad conducts the aiming drill of his squad. But if for any reason the training of the recruits is conducted in three detachments, the aiming drills are to be intrusted to a special Officer, because the importance of this duty and the difficulty which it almost invariably presents to our young soldiers demand a great deal of time. With large squads it is impossible for the non-commissioned officers to deal thoroughly with every man, unless an hour, or thereabouts, is added after dinner, in which case the same interest on the part of non-commissioned officers and men cannot be expected.

The instruction follows precisely the method prescribed in § 8 of the Musketry Regulations. As aiming apparatus for controlling the pupil I

recommend as simple and cheap "die Zielkontrole für das Standvisir," which may be got for 2 marks from Plüddemann, the gunsmith of Hanover, Konigswarthen Place, No. 1.

After about six weeks the men will generally be sufficiently advanced to begin shooting with Zielmunition.[1] Special attention is to be devoted to this means of instruction. It must only take place under the superintendence of an Officer. The hits are to be recorded in a book. The more cartridges used in this preliminary instruction the better will be the result in the later target practice.

The firing of blank cartridges forms the conclusion of the preliminary practice; the number fired by each man is to be regulated by the steadiness and confidence acquired by each. In the last two weeks every man has to fire from the rest at least five ball cartridges at No. 1 target.

I would mention two things in reference to aiming. Everyone knows the favourite question of the non-commissioned officer, "What is meant by aiming?" and the consequent "Aiming is," &c., &c. All learning by rote is useless, above all when the men fail to understand what is said.

It is only Polish recruits that one must hear with real despair murdering this sentence, and then convince oneself by actual trial that they understand what is meant. As the practice goes on the soldier learns naturally how to express himself, what appertains to correct aim, and what faults to avoid.

As practically useful I recommend that the men in moving up to aim and then returning should, as a regular rule, report to the corporal in quitting and returning to the ranks—"to aim," "back from aiming." In this way they soon acquire a military bearing and mode of expression.

During this drill every recruit must daily make some report to the Officer out of the theoretical instruction, and thus learn to express his ideas in a more definite form. Instruction in aiming demands, under all circumstances, the fullest attention and the most careful supervision on the part of the Officer.

Skirmishing by bugle sound is to be practised in the last week, the men having first been taught to know the sounds by hearing them and repeating them by whistling. If they cannot be sounded on the barrack square by the bugler, they must be whistled to the men in the barrack room. It is not advantageous to spend too much time over the simple forms, because the recruits are apt to mistake these for the essence of extended-order fighting.

Extending, advancing, retiring, closing, advancing by rushes, charge of a shooting line,[2] changing the front of wings to resist cavalry, the various modes of firing and fire discipline, those are the chief things to teach as regards the forms of school skirmishing.

But actual practice on ground is of great importance, and is to be taken in hand as often and as early as possible in order to impress on the recruit from the first the distinction between the parade and the natural ground. On the parade everything is symmetrical, nothing done without orders, and all without active volition; in natural ground everything, within the disposition given out, is on individual responsibility, and done independently.

Under ordinary conditions of weather it is possible, without breaking off

[1] Zielmunition, aiming ammunition, is made up with the usual solid metal cartridge-case by putting in a thin paper case for the powder, of which only a very small quantity is used, and a small papier mâché disc, or wad, into which the bullet is set. The bottom of the paper case is perforated to allow the flash of the cap to reach the powder. The bullet is a cylindrical one of about seven to the ounce. This ammunition is used for firing at a board marked with a vertical line like the No. 1 target, or Strich-scheibe. It is used in barracks, the bullet only flying a few paces.

[2] See Reglement, § 102.

the other instruction, to take the recruits nine or ten times out into the country. I have even found that these changes have a good effect on the carriage (*die Dressur*). At first, attending as spectators, the recruits, with the necessary verbal explanations, see how the old soldiers protect the detachment on the march and take advantage of the ground in action, how localities are attacked and defended, how to take advantage of objects on the ground as rests for the rifle. But as soon as the elements of the firing exercise have been acquired, the recruits take an active part in the practice. Thenceforward it is advisable to put the recruits into the ranks of the company. They will thereby be raised in their own opinion, and a great impulse given to their desire to emulate the older soldiers.

In order to keep up the attention and to make the teaching more convincing, some intelligent men with blank cartridge are always to be employed to represent the enemy.

The construction and occupation of shelter trenches can also be combined with this practice if it is not carried out on the drill ground. All exercises in country (*im Terrain*) are to be limited to the immediate neighbourhood, and are not to extend beyond the duration of other drills.

Garrison guard duty is to be formally practised in the last week, being limited to half an hour a day. In this the aid of the older soldiers is to be demanded, since a suitable number of guards will only be formed with them and the recruits, and so the forms of relieving guards and sentries will be gone through. Actual guard duty only can give complete precision.

Oral instruction is to be imparted according to the practical method, and the more important sections are to be lectured on by the Officer. All the question and answer business, so dear to non-commissioned officers, is to be avoided; the instructors must make themselves so completely masters of the subject as to be able to make their questions follow on the answer of the last man without themselves losing the thread of their ideas. The men must be brought to reflect. This, however, is with many a difficulty, and the art of entering into the spirit of the men is no easy one when, in spite of all your conjuring and invocation, absolutely no spirit will show itself. A thorough and intelligible explanation of the Articles of War is one of the first duties of the Company-Chief or recruit Officer, and this instruction must be often repeated after the swearing in, a mere reading over is of little use. Especially Articles 2, 7, 10, 17 to 23, 28, 36–38, 46, 48, 49–51 are to be made the object of instruction, and to be illustrated by examples. In connection with Article 2 (duties of the soldier), the course and chief events of the recent wars may be related in general terms, and those episodes specially dealt upon in which the particular corps took part. When the Officer is not lecturing himself he must carefully supervise the instruction by the non-commissioned officers. It is only in this way that anything good will result.

The training of the instructors is of the greatest importance. For this reason it has been for some years the practice in many corps to put the whole of the drill instructors during autumn through the same course of gymnastics, lasting about three weeks. This course is generally conducted by an Officer who has passed the Central School of Gymnastics. The great advantage of this plan in securing uniform training of the companies is evident.

Where such common preliminary exercise is not yet the custom of the regiment or battalion,[1] it is the part of every Company-Chief to arrange a similar course for his instructors under an Officer or Vice-Feldwebel. Also with reference to other branches of duty, especially in drill and aiming practice, preliminary practice is necessary for the sake of the assistant instructors. Otherwise all sorts of differences and defects will soon creep in, which injure and delay the progress of the training.

[1] Rifles (Jägers) are organized by single battalions.—Tr.

The right use of the assistant instructors is important to consider. Generally the Officer has to leave this to the non-commissioned officers, but he should be careful to see that it is correct. For instance, I cannot think it proper that the training of specially awkward and troublesome men should be made over to them, whilst the corporal is more agreeably occupied with his favourites; exceptionally, when his patience threatens to break down, but not continually, is this allowable. Later, when the Freiübungen and Gewehrübungen are repeated by the squad as a whole, the assistant instructors give the time in front, and in the apparatus exercises they act as aids.

They are only to be employed as instructors when there is no doubt of their knowledge and trustworthiness.

Finally, I would call attention to a point which is indeed chiefly committed to the care of the non-commissioned officers, but is one which may exercise such an essential influence over the whole life of the soldier, that it demands the fullest interest of the Officer—I mean the training of the recruits off duty, their education as soldiers. Under this head I do not mean living within the domestic arrangements of the company, going through cleaning and sewing lessons, being habituated to order and punctuality, but rather the awakening of a sense of honour in the young soldier, of pride in his profession and his arms, of the feeling of fellowship with his comrades, and, last not least, of confidence in his superiors. Let this last be our most anxious care. Precise rules how to go about it are evidently not to be given. It is a special gift, not given to every one, to find the proper tone in his intercourse with the men, and different characters are not to be treated on one single method; nevertheless, the manner and tone of the Officer in personal intercourse with his subordinates sets the example for the non-commissioned officers. Premature strictness, which the man has not been used to in his former circumstances of greater freedom, which affrights him and injures his better feelings by punishment, is out of place here. On the other hand, kindness and patience scarcely ever fail to animate and encourage. Our recruits, with few exceptions, bring with them zeal, liking, and love for the work, qualities which have been handed down from father to son, and which are rooted in tradition; ours is the task of ever more and more promoting and establishing these good qualities—a good kind word is often more effective than all the punishment. Many a recruit who passed the whole of his later service in arrest and imprisonment, and came to ruin at last, would very likely have become a good man and an able soldier if he had received a military training suitable to his character. Then, patience and kindness! and let us see to it that our subordinates follow our example.

Memorandum.

German Drill Books and others referred to.

1. Exerzir-Reglement für die Infanterie; referred to as the Reglement.

2. Schiess-Instruktion der Infanterie; the German Musketry Instruction, referred to as the Musketry Instruction.

3. Vorschriften über das Turnen der Infanterie. Gymnastic Regulations.

4. Vorschriften für das Bayonettfechten der Infanterie. Regulations for Bayonet Exercise.

5. Dienst-Unterricht des Infanterie Gemeinen; by Weisshun. A handbook of instruction in the duties of an infantry soldier.

6. Instruktions-Buch für den Infanterie-Unteroffizier. Instructions in the duties of an infantry corporal, and at the same time also a manual for the Officer in training the under-officers (or corporals). Unteroffizier is inferior to a sergeant.

The Different Orders of Dress. From Infanterie Unteroffizier,[1] *Seite* 15.

1. War service order: Knapsack packed, entrenching tool, havresack, two cartridge-pouches, great coat rolled, cooking-pot, canteen.
2. Guard order: Rifle, bayonet, helmet, one cartridge-pouch, and in case of need knapsack. At guard-mounting, helmet-chain under the chin.
3. Drill order: as specially ordered.
4. Manœuvring drills: as a rule with packs.
5. Orderly duty: Helmet and side-arms.
6. Roll call: Forage cap, only non-commissioned officers with side-arms.
7. Working parades: In summer duck clothing, in winter cloth clothing, with the other over it.
8. Off duty: In many garrisons always with side-arms.
9. General march: Full marching order.
10. Fire alarm: Either in drill order or working dress as ordered.
11. It is permitted to tuck the trousers into the boots at manœuvres, on the march and so on, when the nature of the soil, or state of the weather, renders it desirable for the sake of the health and comfort of the men and for economy.

Weekly Timetable.

Note by Translator.

It is impossible literally to render the timetable into English, because we have no equivalents for several of the exercises named in it. It has been thought better to retain the German names for some parts of it.

The various exercises laid down in it are taken, and this is a very noticeable feature of this method of instruction, *even in the first week*, not only from the drill-book proper (Exerzir-Reglement), but also from the Musketry Instruction and the Gymnastic Regulations. And in addition to these there is a lecture (Instruktion) on the Articles of War and Barrack Duties and Pay for which Weisshun's handbook for the Infantry soldier is quoted. Gymnastic exercises are divided into three parts, called respectively:—

i. Freiübungen and Gewehrübungen.
ii. Rüstübungen.
iii. Uebungen im angewandten Turnen.

I. Freiübungen (free exercises) are of the nature of our extension motions, but carried much further, and include running and jumping. Any exercise, in fact, which can be practised without mechanical appliances is a Freiübung.

Gewehrübungen (exercises with the rifle) are a kind of club exercises, using the rifle as a club.

II. Rüstübungen include all gymnastic exercises which require apparatus to carry them out (such as parallel-bars, &c.).

III. Angewandten Turnen, applied exercises, are all exercises on overcoming obstacles, including marching and running over a country and going up and down steep slopes and precipices in marching order; also the practice in marching order of such Rüstübungen as can be applied to overcoming obstacles. (Gymnastic Regulations, § 33.)

As far as he has succeeded in identifying them, the translator has inserted in the timetable for reference the paragraphs, &c., of the Reglement, the Bayonet-Exercise, the Instruction, or the Gymnastic Regulations, in which the exercises mentioned are detailed. The name of the book referred to has not been added, as it can be inferred from the context. Thus, § 6, 2 in connection with a Freiübung refers to Gymnastic Regulations, while § 8 in connection with Aiming drill refers to Musketry Instruction, and a reference under Drill is to the Reglement.

[1] The Germans have only one coat, a tunic, for full dress and undress.

WEEKLY TIMETABLE.

First Week.

Order of dress: Undress with forage cap (*Appellanzug*).

1. Drill: Position of the soldier; turnings by numbers; ideas of dressing and covering; walking without keeping step and with intervals; forming up[1] in single rank in line and in file right in front. § 1, § 2, § 18, § 27.

2. Compliments; saluting; passing at attention; halting and coming to the front.

3. Aiming drill: Aligning a rifle fixed in a rest or on a sandbag by the instructor; the point of aim to be declared by the man; explanation of sight, bead, target. § 8.

4. Freiübungen: Men fall in in single rank.

a. Position of the feet: Primary position or position of attention; close position. § 6, § 7.

b. Foot and leg movements: As preliminary practice; raising the heel from the primary and close position; bending the knee from the primary position, beginning in four motions.

c. Movements of the trunk: Turning the body from the primary and from the close position. § 8.

d. Movements of the arms and hands: As preliminary, movements of the hand upwards, downwards, forwards, backwards, as well as to right and left, stretching the arms upwards, sideways, and forwards, in two motions by numbers. § 9.

e. Movements of the head: Turning the head right and left; bending it forwards and backwards. § 10.

5. Lecture: Articles of War; barrack regulations, details of pay (Weisshun I, II, V 1, and VI 1).

Remark 1.—In all the Freiübungen the Hüftstütz (position with hands resting on hips) is to be used when the body requires a firmer hold, or when the arms, if hanging down, interfere with the movements. § 5, 2.

Remark 2.—In order to avoid needless repetition in the text in future, in every following week only the new additional exercises are quoted. It is of course assumed that the exercises of the previous weeks are always repeated as far as required.

Second Week.

Dress: Appellanzug, with spring bayonet.[2]

1. Drill: Closing and dressing back by numbers; individual dressing by files.

2. Compliments: As before.

3. Aiming drill: Aiming at a mark ordered by the instructor; rifle fixed on an aiming stand, and also lying loose on a sand-bag; explanation of the errors in aiming. § 8.

4. Freiübungen.

a. Position of the feet: Walk position; stride position. § 6, 2, and 6, 3.

b. Movements of foot and leg: Raising the heel (off the ground) from all the positions of the feet, also with upstretched arms (§ 9); bending the knees from attention with upstretched arms; flexion of the knee upwards; stretching the knee forwards and backwards (§ 7, 7); rolling the foot (§ 7, 8); standing jump without gaining ground (in three motions at first), with hands resting on hips and also with the arms hanging freely down (§ 12).

[1] This is done by a squad dispersed or in extended order. Compare Part II, General Rule XIII of our "Infantry Field Exercise." Similar exercises occur in 3rd, 4th, 6th, 7th, and 8th weeks.—TR.

[2] Bayonettfechtgewehr. Rifle fitted up for bayonet practice.

c. Movements of the trunk (§ 8): Bending the trunk forwards from attention and from the stride position, both to front and rear, also with upstretched arms; turning the trunk (§ 8, 3) from attention and from the close position with arms stretched forward.

d. Movements of the hands and arms (§ 9): Stretching the arms backwards and downwards, by numbers; circular movements of the hands with the arms stretched out sideways and forwards.

e. Movements of the head (§ 10): Bowing the head sideways.

f. Freiübungen in motion: Individual running (§ 11).

5. Gewehrübungen: Men to fall in in single rank. (The whole of the exercises are carried out in the stride position.)

With both hands (§ 13, Fig. 12); seizing the rifle with both hands; holding the rifle out to the front (Fig. 13).

6. Exercises in ground (*im Terrain*): As a spectator at a marching and fighting exercise by the older soldiers; explanation of the ground.

7. Lecture: Repetition—On superiors and military ranks (Weisshun I, II, V 1, VI 1, and III).[1]

Third Week.

Dress: As before.

1. Drill: Turnings, § 2; closing, § 4; dressing back, man by man, by word of command, § 18; forming up in single file left in front.

2. Compliments: Marching past with arms at slope.

3. Aiming drill: Grasping the small of the butt; mode of pressing the trigger; firing with rifle fixed in a rest. § 8.

4. Position drill: Taking up the regulation position for the ready, without rifle. § 9.

5. Freiübungen: In two ranks.

a. Position of the feet: Change of position.

b. Movements of the foot and leg: Moving and lifting the leg sideways, forwards, and backwards. § 7, 5.

c. Movements of the trunk: Bending the trunk sideways. § 8, Fig. 8.

d. Movements of hands and arms: Raising the arms sideways and lowering them; stretching the arms forwards, upwards, sideways, backwards, and downwards, by word of command. § 9, 2, and § 9, Fig. 10.

e. Freiübungen in motion: Standing jump forward with hands on hips; also with arms hanging down, § 12, 1; individual running with spring bayonet (*Bayonettfechtgewehr*). § 11.

6. Gewehrübungen: In two ranks.

a. With both arms; rifle raised forwards and upwards; raising and lowering the rifle from the last position; bending the trunk forwards with rifle held upwards. § 13, Fig. 13, and Fig. 14.

b. With one arm: Rifle to right and left; rifle to the front; assuming the position of present on right shoulder. § 14, Fig. 15, § 15.

7. Rüstübungen: Squad to be formed up at the different tackles and apparatus, and explanations of them given. § 16, 7.

a. Horizontal beam: Simple jumping on and off; standing on the beam. § 17, Fig. 21.

b. Horizontal bar: Hanging by the hands, § 20, Fig. 23; drawing the body up by the hands, once only.

c. Jumping bar: Standing jump. § 28.

8. Exercises in ground: As before.

9. Lecture: Of superiors and military ranks (Weisshun III).

[1] Superiors (*Vorgesetzen*) include all, from Generals to corporals, who are set over the soldier.—Tr.

Fourth Week.

Dress: Undress, forenoon with rifles; afternoon with spring bayonets.

1. Drill: Positions with rifle at "the order," § 5; piling arms by threes, § 6; turnings; closing; dressing back without the rifle three or four men together, § 19; dressing man by man with arms at slope; sloping arms by numbers in three motions; ordering by numbers in two motions; position with rifle at slope; march with (*Hüftstütz*) hands on hip, also with arms by the side; forming up in line two deep, and in file right and left in front.

2. Compliments: As before.

3. Aiming.

4. Position drill; ready; correct positions of the rifle.

5. Freiübungen.

a. Movements of the feet and legs: Flinging out the legs (*Beinspreizen*) sideways and forwards; bending the knees right and left from the stride position. § 7, 6.

b. Movements of hands and arms: Rolling the arms forwards and backwards.

c. Freiübungen in motion: Standing jump backwards with hands on the hips; running jump with hands on hips, also with arms hanging freely down; running without the rifle two or three men together.

6. Gewehrübungen.

a. With both arms; As before.

b. With one arm: Rifle at arm's length to one side; horizontal movement of the arm carrying the rifle.

c. Position of present: Assuming the present from left shoulder; rolling the arms forwards and backwards.

7. Rüstübungen.

a. Horizontal beam: Changing position of the feet.

b. Horizontal bar: Raising the body once with overhand grip, twice with underhand and double grip, Fig. 23; jumping standing to the supported position (§ 21, Fig. 29).

c. Jumping bar: Standing jump with a run of three steps, from right and from left foot.

8. Exercises in ground (*im Terrain*): March with precautions for security; utilizing ground for cover.

9. Lecture: On compliments (Weisshun IV 1 and 2).

Fifth Week.

Dress: Forenoon—Guard order (helmet and forage cap alternately) with rifle; afternoon—undress (*Appellanzug*) with spring bayonet.

1. Drill: Advancing arms in three motions by numbers; ordering in two motions by numbers; position with rifle at the advance; dressing man by by man with rifle at order and with sloped arms; turnings; closing; three or four men together dressing back with shouldered arms; marching individually and without arms.

2. Compliments: To be repeated off and on as necessary.

3. Aiming and position drill: Without a rest, presenting and taking aim, but without pressing trigger (*Druckpunkt nehmen*)[1] or firing.

4. Freiübungen.

[1] *Druckpunkt nehmen.* The trigger of the Mauser rifle has on its upper edge two rounded projections. These with the extreme end make three *Druckpunkte.* When the trigger is gradually pressed by the finger these two projections come into action successively and prepare the man for the actual explosion, thus giving the advantage of a hair rigger.

a. Movements of the feet and legs: Continued raising and lowering of the heel; continued bending and straightening of the knee.

b. Movements of hands and arms: Continued stretching of the arms upwards and downwards, forwards and downwards; stretching the arms on alternate sides in various directions.

c. Freiübungen on the move: Sideways jump with hands on hips, also with arms hanging freely down; individual running with rifle and bayonet.

5. Gewehrübungen.

a. With both arms: Turning the trunk with rifle held out in front. § 13, 5.

b. With one hand: Raising and lowering the rifle with outstretched arms (§ 14, Fig. 17).

c. At the present: As before.

6. Rüstübungen.

a. Horizontal beam: Turnings.

b. Horizontal bar: Raising the body twice with overhand grip, the same thrice with underhand and double grip; raising the hands (§ 20, 3) from the first and second positions with overhand, underhand, and double grip; moving along by the hands while hanging at length; getting on the bar (§ 21, Fig. 29) with weight on the hands; raising and lowering the body twice from this position (Fig. 30. *a*) (bar breast high).

c. Jumping bar: Jumping with three paces run; from right and from left foot.

7. Exercises in ground: Taking advantage of the ground for cover and to support the rifle; to be gone through with each man individually.

8. Lecture: General obligations of the Service (Weisshun IV 3, 4, 5, 6, 8, 12, 13).

Sixth Week.

Dress: As before.

1. Drill: Slope and order arms; advance and order individually by word of command; slope from advance by numbers in three motions; loading with drill cartridge from the order in three motions; marching without arms with turning and changing step; individual march with arms at slope and without arms alternately; forming up by ranks in column of sections right and left in front.

2. Aiming and position drill: Aiming with the rifle on a stand, taking the proper pressure (*Druckpunkt nehmen*), and firing.

3. Freiübungen.

a. Movements of foot and leg: Continued throwing out of the right or left leg. § 7, Fig. 4.

b. Movements of hand and arm: Simultaneous stretching of the arms in every direction one after another. § 9, 1.

c. Freiübungen on the move, three or four men with rifle and side-arms running together.

Note.—The Freiübungen have now been gone through. They will henceforth be repeated daily for at least half an hour, both individually and in small parties of five or six men. As the men become more accomplished in this form of their movements, the Freiübungen will be performed by whole sections put together in groups. This will be done to fill up the time between the Gewehrübungen and the apparatus exercises, or as introductory or final exercises at the beginning or end of the day's work. The running will be gradually increased, but always with due regard to the ground and state of the weather.

4. Gewehrübungen.

a. With both arms: Standing jump without gaining ground, with rifle held over the head. § 13, 6.

b. With one arm, repetition.

c. At the present: Lowering the rifle from the high aim. § 16, Fig. 20.

5. Rüstübungen. (Apparatus exercises.)

a. Horizontal beam: Forward or backward movement with successive feet; the same with alternate feet.

b. Horizontal bar: Raising the right (or left) leg forwards whilst hanging at full length with underhand grip, § 20, 6; raising the leg sideways over the bar from the position of support, § 21, 3, Fig. 31; raising the rump in the same way. Fig. 32, *a.* (Bar breast high.)

c. Jumping bar: As before.

6. Exercises in ground: Same as last week.

7. Lecture: General duties and obligations. Weisshun IV 7, 9, 10, and 11.

Seventh Week.

Dress: As before.

1. Drill: Mode of porting arms by numbers in two sections; loading from the slope with drill cartridges; march with rifle at slope and advance: forming squad in line, also in file right and left in front.

2. Aiming and position drill: As before; shooting from a rest with aiming ammunition (*Zielmunition*).

3. Freiübungen: Half an hour's repetition daily.

4. Gewehrübungen.

a. With both arms: Repetition of all the exercises.

b. With one arm: Lowering and raising the muzzle to right (and left), also forwards and backwards, § 14, Fig. 18.

c. At the present: As before.

Note.—The Gewehrübungen have now all been learned. They are to be repeated daily in due proportion, both individually and by three to four men, and when confidence and perfect form of the movements has been attained by the whole squad.

5. Apparatus exercises.

a. Horizontal beam: Repetition of all the exercises.

b. Horizontal bar: Hanging horizontally by right (left) knee, with the bar at height of head (Fig. 24); jumping to the position of support, and raising the rump (bar breast high); raising the body on the arms three times (§ 21, Fig. 30, *a*); raising the chin up to the bar three times with overhand grip, four times with underhand and double grip.

c. Jumping bar: More difficult efforts in high and wide jumps.

6. Bayonet exercise: Position with rifle to be practised in two motions, advancing and retiring.

7. Exercises in ground (the recruits are henceforth to be put into the company): Formation of company column in zugs and half-zugs; occupation of a position; withdrawing out of it into a receptive position (*Aufnahmestellung*); firing in retreat.

Service patrolling.

8. Lecture: The infantry rifle, M. 71. (Weisshun VIII.)

Note.—The lecture on the rifle has already taken place during the cleaning hour, and henceforth is only a repetition.

Eighth Week.

Dress: As before.

1. Drill: Present; shoulder in two motions by numbers; the rest of the manual already practised by word of command, individually and three or four together; the ready from slope and locking arms.[1] In rank entire, turnings, closings, dressing back and dressing by files with rifle at slope; march with rifle at slope and at advance, individually and by files, covering and abreast;

[1] See Reg., § 7, Seite 24.

turnings on the march; right incline and left incline; forming up the whole squad in column of sections right and also left in front.[1]

2. Aiming and position drill: As before.

3. Freiübungen: As before.

4. Gewehrübungen; the exercises with one hand, and at the present to be especially repeated.

5. Apparatus exercises.

a. Horizontal bar: Hanging on one side of the bar by right (or left) knee, § 20, Fig. 25 *a*, swinging the leg over from the position of support, Fig. 31; standing jump to the position of support with one leg thrown out.

b. Jumping bar: As before.

c. Double rope: Hanging at length; drawing the body up twice only.

d. Single rope: Hanging at length.

e. Ladder posts: Ascending and descending with successive movements § 26, 1.

6. Bayonet practice: Pointing—inside points, outside points (to be practised in two motions). § 9.

7. Exercises on ground: Action of shooting line against cavalry attacks; action of supports; advance by rushes against an enemy; wherever possible throwing up and occupying shelter trenches.

8. Lecture: Theory of musketry (Weisshun X).

Ninth Week.

Dress: As before.

1. Drill: Position in rank with rifle at order, at the advance and the slope; the ready; the present; as you were; locking arms, and slope arms individually by word of command; the whole manual in the ranks at open order; judging the time for attack, rifles on the right; fix bayonets; charge bayonets; unfixing bayonets; individual march with manual by word of command; filing right and left; individual parade march.

2. Aiming and position drill: Independent aiming; firing with aiming ammunition on a rest; firing with blank cartridges on a rest at target No. 2.

3. Freiübungen
4. Gewehrübungen
5. Apparatus exercise

} As before; will therefore not be named in future.

a. Horizontal bar: Hanging head downwards, § 20, Fig. 26; hanging on one side from right (or left) knee and swinging, Fig. 26 *a*; close jump to the support position with both legs outstretched, Fig. 32 *b*; close jump to same position with both legs thrown to one side.

b. Double rope: Raising the body four times only; climbing with alternate hands. § 24.

c. Single pole: As before.

d. Climbing rope: Hanging.

e. Ladder posts: Going up and down hand over hand.

6. Bayonet exercise: Lunge (in three motions).

7. Exercises on ground: Attack and defence of localities.

8. Lecture; punishments; ammunition.

Note.—From the ninth week the recruit Officer himself lectures three times a week, especially on the Articles of War, punishments, compliments, theory of shooting, garrison guard duty, and fighting ("Das Gefecht," Weisshun XIX A).

Tenth Week.

Dress: As before.

1. Drill: The manual; firing exercise; turnings; dressing by points, to be

[1] Probably both this and the similar exercise in last week are meant to be done three deep.—TR.

practised in rank entire; parade position at the present, and the advance; marching to the front in rank entire, § 27; turnings on the march; changing direction, § 30; right and left incline, § 28; individual march with manual exercise; individual marching past to the drum.

2. Aiming and position drill: As before; firing with blank cartridge standing (without a rest).

3. Apparatus exercises.

a. The beam
b. Jumping bar
c. Double rope
d. Single rope
e. Climbing pole
f. Ladder post

} Repetition of the previous exercises; will therefore not be mentioned again.

3. Horizontal bar: Hanging sideways with underhand grip; vaulting from the stand, and with a run; bar breast high, § 23.

4. Bayonet exercise: Repetition.

5. Exercises on "ground:" As before, with blank cartridge.

6. Skirmishing by bugle: Extending; halt; fire (correct front, position of feet, present); cease firing; advance; retire; close.

7. Lecture: Organization of the army (Weisshun XIV, XV).

Eleventh Week.

Dress: As before.

1. Drill: Dressing in ranks by files with front oblique; the manual in the sequence of the book; forming up by sections and zugs; turning into file (right and left), § 66; wheeling by sections right and left; march past in ranks to the drum.

In squad for one hour every morning; dressing by point (§§ 19 and 45) and files (correct distance and covering); manual; firing exercise; volley-fire by ranks, § 22; independent fire, § 23; turnings; closing; filing right and left; marching in line, each time concluding with march past by files with rifle at slope and at port (*Angefasstem*).

2. Compliments: Marching past and porting arms.

3. Aiming and position drill: Firing with ball cartridge from a rest at target No. 1 (*Strichscheibe*).

4. Apparatus exercises: Horizontal bar; hanging sideways with underhand grip, and (§ 20, Fig. 27) drawing up the body as preliminary to mounting on the bar, § 22, 2.

Bayonet exercise: Inside parry; outside parry.

6. Exercises on "ground:" Outpost duty; to make the recruits understand the difference between field duty and garrison guard duty; putting out a picquet with sentries and patrols.

7. Skirmishing by bugle sound: Prolonging, reinforcing, and reducing the shooting line; bringing up the support at a run, and in quick time for volley-firing; charge of the shooting line; attack; alarm; prepare for cavalry; fixing and unfixing bayonets.

Garrison guard duty: Relieving the guard; posting sentries; relieving sentries; compliments paid by guards and sentries.

9. Lecture: The fight (Weisshun XIX A).

Twelfth Week.

Dress: As before.

1. Drill: Position, march, and the manual, and to be often practised in detail, so that the men may not from drilling as a body become too rigid; and, in squad, wheeling from line into sections; forming zugs from sections; moving to right and left in file; turning on the march; right and left incline; parade march to music in ranks and in squad.

2. Aiming and position drill: Repetition.
3. Apparatus exercises: Repetition, especially of exercises on jumping bar and horizontal bar.
4. Bayonet exercises: Repetition.
5. Skirmishing by bugle sound: Repetition.
6. Garrison guard duty: Conduct of sentries by night and day in special circumstances; conduct of escorts and patrols.
7. Lecture: Garrison guard duty; orders and decorations (Weisshun, XII–XIII); repetition.

Note.—If any days should still be available before the inspection, they will be entirely devoted to repetition.

OUTRAM'S DIVISION WATCHING LUCKNOW, 1857–58.

A Tactical Study.

By Captain Sir James Seton, Bart., late 102nd Fusiliers.

On the 26th November, 1857, had been completed the withdrawal from the Lucknow Residency and adjoining palaces of the British garrison, which had since the month of July held that position against the mutineers and rebels then in possession of the remainder of the city and of the entire province of Oude. The original garrison had been, on the 25th September, reinforced by a small field division which, after two unsuccessful attempts to advance from a base established at Cawnpore, 45 miles distant, had at last succeeded in reaching Lucknow, and in breaking through the besieging forces of the enemy. The arduous street fighting, however, which the latter operation entailed had greatly crippled the effective strength of the Division, and increased the numbers of the sick and wounded requiring transport and escort. To these incumbrances had to be added, in any calculation as to the possibility of farther movement, the large proportion of non-combatants, including women and children, the rescue of whom from the power of an enemy who gave no quarter was the principal object of the hazardous operation. To all intents and purposes, then, the British troops which had joined hands in Lucknow were deprived of all mobility till the arrival towards the end of November of the Commander-in-Chief at the head of a stronger Division, composed of troops which had shared in the capture of Delhi, reinforced by fresh arrivals from England. No sooner had the combined operations of the two Divisions, working towards each other from within and from without the city, resulted in establishing means of exit from the beleaguered Residency and palaces for those whom the rebels had looked on as about to become their victims, than that Officer, now considering that his first duty lay in providing for the safe transit out of the revolted province of the long convoy of sick and wounded men and of women and children, resolved on at once marching to his immediate base at Cawnpore, at the time placed in much jeopardy by the attack of a strong body of rebels who had, meanwhile, advanced from a more western province. While he thus abandoned to the insurrection one of the most important cities of India, the eventual capture still remained one of the principal objects of the campaign. Consequently, besides that it was inexpedient politically to withdraw from this province all evidence of British hold on the country, it was advisable strategically to make an effort to retain in check the large force of the enemy collected in this quarter, which would otherwise have been free to operate against the British line of communication between the North-West Provinces and Calcutta. The advantage was also obvious of having a body of troops in position to cover the concentration of a sufficient force, and the collection of material and supplies when the time should come for operating more offensively against the rebel city.

The Division to which this duty of observation was assigned—almost identically the same which had reinforced the original garrison in September—comprised on the date of taking up the position about to be described—

7 battalions;
4 squadrons;
3 field batteries;
1 garrison or siege battery; and
1 company of sappers.

The organization was thus apparently the same as that laid down by regulations in force at the present day. The battalions, however, had been reduced to a strength varying from 300 to 600 of all ranks, and the cavalry, though not proportionally weaker, had a most heterogeneous composition. Of the 370 sabres 221 were Military Train drivers, 67 were volunteers from the infantry and from civil life who had been put through as much rough and ready training as the press of active service would allow, and 80 were the remnants of two native irregular regiments.[1] One only of the batteries (eight guns) was horsed, and of the remaining ordnance which comprised, at first 36, subsequently 51 guns, howitzers, and mortars, 10 were field-pieces drawn by bullocks.

In addition to the above detail there was placed under the command of the Divisional General a detachment consisting of a weak battalion and two guns which had been left to hold an important bridge, 12 miles distant along the only macadamised road which led from the Ganges to Lucknow. The total combatant strength was 4,442, and that with the headquarders of the Division was a little below 4,000.

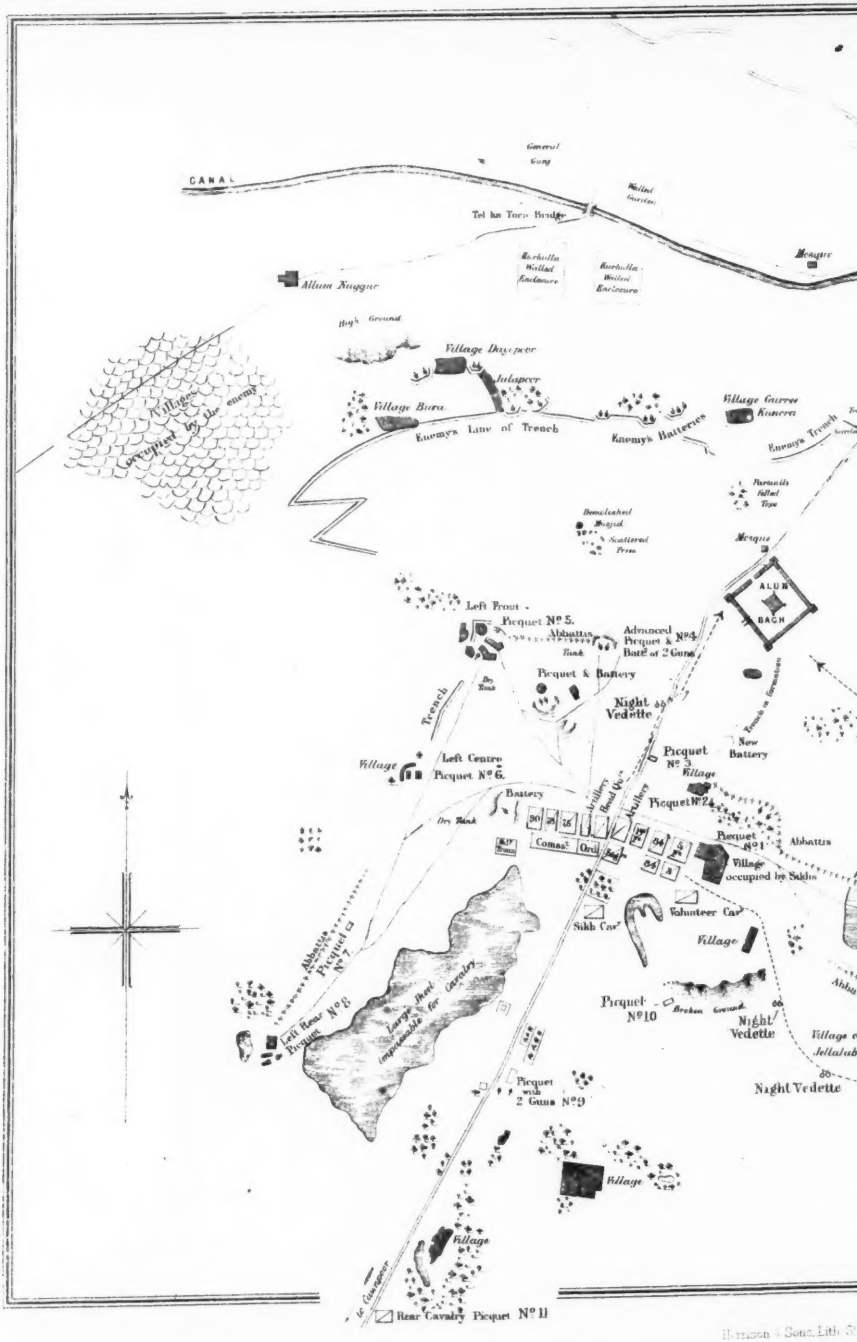
Excessive demands on all the means of transport available compelled the Commander-in-Chief to restrict the carriage left with this Division to the amount which would enable a couple of battalions to move out with ammunition and supplies in case unforeseen necessities should arise. It was, therefore, for a time deprived of mobility, altogether from a strategical, partially from a tactical point of view.

This last condition should not be lost sight of in case the question arises in the mind whether the duty assigned to this Division might not, at any stage of the operations, have been performed with equal efficiency and with less hazard by withdrawing to a position more remote from the enemy's works, and offering greater natural advantages if such could have been found on the Cawnpore road.

The armed strength of the rebels occupying the city appears at an early period of these operations to have been estimated at some 50,000 men. On the occasion of the demonstration which they made against the British position on the 12th January, the information obtainable went to show that their numbers amounted to 60,000. As the final attack on the city was delayed, and the hopes of the rebels for independent rule increased, while the Commander-in-Chief was achieving successes in the revolted provinces between the two great rivers of Northern India, there was a constant flow to the standard of the boy-pretender who had been set up to the Oude throne of feudal chiefs with their followers, and of mutinous regiments of the Bengal Native Army retiring before the British arms as these cleared the more distant provinces. Thus, towards the end of the same month two independent sources of information, one of which was stated by the spies to be the pay lists furnished to the court, enabled the head of the Intelligence Department to frame a calculation which, after allowing for exaggerations and attempts at peculation, fixed the strength of the enemy in and around the city at over 100,000, of whom about 80,000 were organized infantry, 7,000 cavalry, with some 100 guns of various calibres.

The armament, discipline, and military *morale* of the British troops weighed in the scale against the numerical superiority of their enemy to an extent which need not here be enlarged on. Enough to say that most of the batta-

[1] The Military Train had been sent from England to form the transport corps of the China Expedition, diverted to Calcutta on the news of the insurrection in India, and organized as cavalry. They had marched up with the second relieving division, and were thoroughly efficient. The volunteer and the native cavalry had formed part of the besieged force, their horses consequently were in such poor condition, that for some time they were unable to get out of a walk. Scarcity of adequate forage in the new camp delayed for long their regaining condition.



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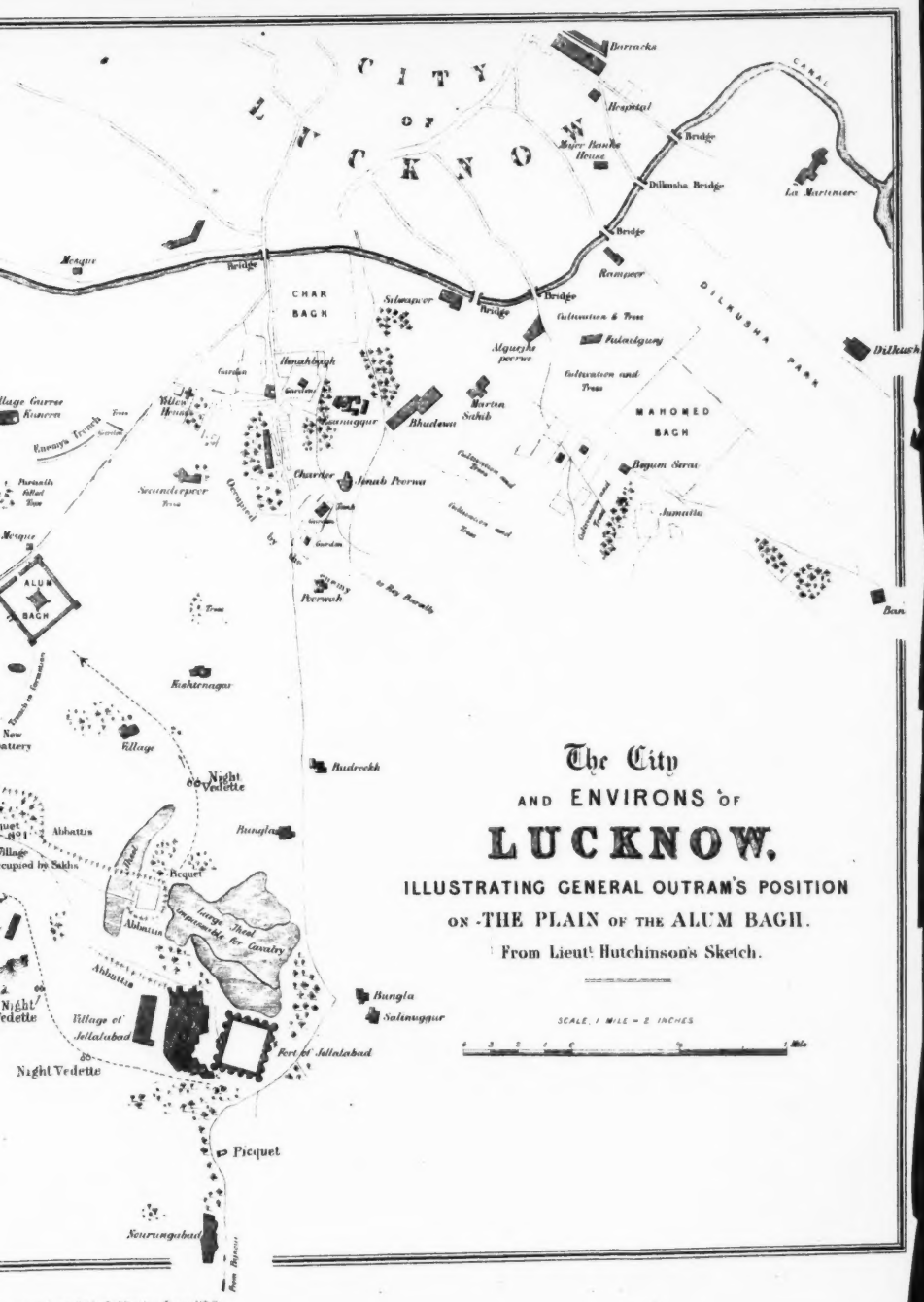

The City
AND ENVIRONS OF
LUCKNOW.

ILLUSTRATING GENERAL OUTRAM'S POSITION
ON THE PLAIN OF THE ALUM BAGH.

From Lieut[t] Hutchinson's Sketch.

SCALE, 1 MILE = 2 INCHES

Gouc. Lith. 5 Martins Lane W.C.

lions of the former used the lately-introduced Enfield rifle,[1] which had a range up to 900 yards, and that the infantry of the latter had nothing better than smooth-bore muskets or matchlocks of various patterns.

As regards leadership also it need only be remarked that although some energy was shown in the direction of the rebels' operations, there was at their head no person previously accustomed to the exercise of military command. Internal dissensions and jealousies, moreover, frequently marred the execution of well-devised plans of operation.

The position taken up by the British Division was chosen with a view to have a command over the already mentioned line of communication with Cawnpore, to preserve touch with the enemy, and to utilize any advantages of ground which might be obtained consistently with the two first objects. It was also desirable to secure against molestation some considerable tract of grazing ground for the cattle, on which the Division depended for meat supply.

The country by which the Grand Trunk road approaches Lucknow is almost entirely flat, the fields are unfenced, and the cultivation is mainly dry. Though the city was then, as now, an open one, the southern and eastern outskirts possessed, as will be seen from the sketch, some elements of artificial fortification. The canal served much of the purpose of a wet ditch, beyond which frequent strongly-built houses with garden enclosures, and villages with mud walls, answered as outworks along a line nearly parallel to, and at no point more than a mile and a half distant from the canal. Outside this line extended something like a clear esplanade with the following modifications, of which latter advantage was taken by the British Division.

On either side of the high road, and within half a mile of the most advanced cover occupied by the enemy, stood respectively a small mosque and the massive flat-roofed house, with its walled garden, called the Alum Bagh. These had been occupied and adapted for defence by a detachment which the Division, when it entered, in September, on the course of street fighting which brought it into communication with the original garrison of the Residency, left in charge of sick and baggage till the arrival of additional relief under the Commander-in-Chief.

This post had consequently been tested as one of vantage, both for observing the enemy and for maintaining command over the high road. But it stood so close to cover which the Division was not strong enough to deny to the enemy's occupation as to be constantly under his artillery fire, and the enclosure was not extensive enough to shelter the entire force with baggage, tents, hospital, and followers. It was, therefore, held as an advanced post, while a position for the camp was sought farther in rear.

The ground being, as has been said, unvaryingly flat, no natural cover against the enemy's projectiles was forthcoming. This circumstance was not, however, of so much moment as if the enemy had been provided with fire-arms of longer or even of equally long range. But his great numerical superiority, which rendered feasible an attack from all quarters simultaneously, made it advisable to place as many material obstacles as possible in the way of any attempt by simply pressing forward regardless of loss—as would have been the tactics of the Zulus or Arabs—to surround, rush in upon, and by sheer force of numbers overwhelm the small body of British troops.

The high road at nearly a mile and a half to the rear of the advanced post of Alum Bagh passes through a grove of trees, and an imaginary line drawn perpendicularly across the road a little in advance of this point runs to the right between two mud villages and an open wood, reaching at a distance of

[1] The superiority derived from the possession of the Enfield was much impaired by the fact that a large proportion of the men armed with that rifle had not been trained to the use of it, either as regards the then necessary reversal of the cartridge on loading, or the adjustment of the sights.

somewhat more than a mile a couple of nearly contiguous swamps or lakes, one of which was impassable for cavalry. In rear of the extreme swamp stood a mud fort and village, and these three adjacent obstacles to the free movement of troops had a common front towards the city of about a mile, and extended about three-quarters of a mile in a direction perpendicular to that front.

On the left, within half a mile of, and parallel in its greatest length to, the high road, lies another marsh, offering an obstacle impassable by cavalry, of a mile and a quarter in extent.

The British camp was pitched, as will be observed from the sketch, astride of the high road, with an infantry brigade on either side of it; the artillery and the staff in the centre of the first line; the cavalry distributed in second line. The left flank was partially secured from an immediate turning movement by the last-mentioned marsh, and the right by a village, which was occupied by the weakest battalion of the Division.

It will be as well to notice here that the front of the camp was exactly a mile in length, and that, if the space contained between the marsh on the left flank and the village on the right had been looked on as the position to the defence of which the operations of the Division were to be restricted, the number of men available for the purpose (not quite 4,000) was less than half that which a tactical rule for cases when both belligerents are taken to be contending on pretty nearly equal terms prescribes as suitable—viz., for 1,760 yards at five men (including all arms and reserves) per yard=8,800.

But if the British General, while assuming that the inferiority of the enemy, both in respect of armament and of physical and moral qualities, justified him in proposing to hold a position with half the number of troops required under normal conditions, had decided on remaining there, strictly on the defensive, covered by such outposts only as would have been required to give notice of an attack and time for the Gross[1] to get under arms, he would have left to the enemy the liberty of occupying the Alum Bagh enclosure and the village to the left front of the camp as points of *appui* from which to attack the position in front, and of seizing the fort and village of Jellalabad, admirably situated as a pivot for operating against the rear and line of communication.

While placing, therefore, his camp in the position described, well out of range from the advanced line of cover held by the enemy, he resolved on including these three strongholds in his line of outposts and to make that line —not the immediate front of his camp—the position on which any attack should be received and resisted to the utmost. Moreover, as the numerical superiority of the rebels, the absence of any body of troops in immediate support of his own Division, and the open nature of the country brought an attack on his rear within the bounds of calculation as a not unlikely contingency, it was necessary to prolong the chain of posts round the flanks, so as to include the rear.

It was thus that the position, at any point of which, if attacked, the enemy was to be met with determined resistance, came to extend along a front of over 3 miles, with an equal depth, and a total perimeter of over 10 miles.

Up to the morning of the 27th November a chain of posts, covering a front nearly identical with that just described, had been furnished for some days by the Division, which, under the Commander-in-Chief, had co-operated in the relief of the beleaguered garrison, and which on that day entered on the return march to Cawnpore.

At sunrise the Division ordered to remain in observation of the city took over these posts, furnishing two detachments of infantry with two guns, one

[1] Term used in old English military language for "main body," *vide* "Clarendon's History of the Rebellion and contemporary accounts of Marlborough's Campaigns," identical with that of "Gros" still used in the same sense by French and Germans.

of eighty and one of sixty, all of which were shown their ground by an Officer of the Quartermaster-General's Department.

On the following day the fort of Jellalabad was garrisoned, and on successive days modifications were effected, including the establishment of fresh picquets for the protection of the rear of the camp, now left uncovered by the withdrawal of the Commander-in-Chief's Division, until, on the 1st December, a list of the outlying picquets was published in the order books.

The Outpost line, that is to say, the line on which stood the two strongholds and the villages or other points selected for the picquets, and on portions of which were placed material obstacles, such as abattis, was for the most part equally the line of observation and of resistance, and it was for the greater duration of the operations under notice occupied as follows:—

Fort of Jellalabad.	By a detachment[1] consisting of 200 infantry (half from each brigade), 2 guns, and 40 cavalry. These last were subsequently reduced to 30, ultimately to 7 troopers. The relief took place weekly.
Picquet half-way between the fort and camp, and blocking the interval between the two swamps.	Furnished by the Jellalabad detachment, and consisting of an Officer's party of varying strength of infantry, with troopers enough to throw out a double vedette.
Alum Bagh enclosure.	Garrisoned by a detachment of, at one time, 200, afterwards 250, latterly 225, infantry, made up of quotas from each brigade and relieved weekly. There was also a detachment of artillery furnished to man the guns of position in the enclosure.

These posts were each under the command of a Field Officer detailed by name in Division orders on the occasion of each relief, and were outside of the control of the Field Officer of the day, who held command over the outlying and inlying picquets. Until a late period of the operations, when the proportion of Officers and men at the picquets was increased, the reliefs of the latter took place daily at sunrise.

The Outlying Picquets were—

No.	Post.	Composition.
1	About 500 yards in front of the village on which the right of the camp rested.	27 infantry, furnished by the battalion immediately in rear. 2 guns.
2	Ruined village in front of the camp of right infantry brigade.	Infantry—1 corporal and 6, latterly 3, privates.
3	On the high road about 200 yards in front of the centre of the camp.	1 subaltern and by day 25, by night 40, infantry from right brigade, with 1 corporal and 6 troopers.
4	Midway between Alum Bagh and the village at the extreme left of the front chain, ¾ mile from camp.	1 Captain, 1 subaltern, and 50 infantry at first from the left brigade. 2 guns.
5	In the village just mentioned ¾ mile from camp.	1 Captain, 1 subaltern, and 50 infantry from the left brigade. 2 guns. N.B.—Later on the right brigade took it in turn to furnish Nos. 4 & 5.

[1] This detachment was occasionally called on to furnish a guard to cover the commissariat herd when sent out to graze in this quarter.

No.	Post.	Composition.
6	In a village nearly 1,000 yards to the left of the camp, and on the prolongation of the line of front of the latter.	22 infantry from the left brigade, probably under a subaltern.
7	At a point intermediate to Nos. 6 and 8, the exact position of which cannot be traced.	18 cavalry at the commencement of the occupation. These were transferred to No. 11.
8	In the village at the south-west angle of the lake or swamp on the left rear, 1¼ miles from camp.	30 infantry from left brigade, probably under a subaltern.
9	On the high road, ¾ mile in rear of the centre of the camp.	1 subaltern and, by day, 30, made up at night to 40, infantry from the right brigade. 2 guns.
10	About midway between the right rear of the camp and the village of Jellalabad.	14 infantry from the weak battalion on the right.
11	On the high road about 1 mile beyond No. 9.	18 cavalry.

At a later period of the occupation rifle-pits were dug near the demolished mosque in front of picquet No. 4. These were manned at night by a party of ten picked shots under a subaltern, who were withdrawn at uncertain hours in the morning.

At one time picquet No. 5 used to detach during the night 1 corporal and 6 privates to a point in rear where they would stand in the way of an enemy penetrating between Nos. 4 and 5 or 6, as well as constitute a connecting link between the outposts and the camp.

The foregoing details as to the positions and strength of the picquets as well as of the garrisons in the two fortified enclosures have been taken from the order book of the Division. That document naturally contains no instructions for the interior organization of the two strong detachments, or of the various picquets, these being left to the discretion of the respective Field Officers. From the recollections of Officers who took tours of duty on that section of the outpost front which was constantly exposed to the most persistent and harassing efforts of the rebels, the subjoined information has been obtained as to dispositions within and around the Alum Bagh enclosure as well as at picquets Nos. 4 and 5.

Alum Bagh.—The wall was high enough to make ladders necessary to an enemy seeking to effect an entrance by surprise. Outside the four angles were thrown up bastion-shaped earthworks to cover these salients and to flank the four faces. The main gate in the centre of the north-west face was protected on the outside by a loopholed breastwork. With the view of obtaining less exposed communication with the camp, a second gateway was opened in the south-west face. Inside the wall a banquette was provided.[2]

[1] There is some doubt as to whether this picquet was not replaced by one of fifty infantry from the left brigade, but although the "Divisional Order Book" at first sight leads one to suppose this, no subsequent allusion to it is to be found.

[2] Some, if not all, of these improvements in the defences had been effected during the time when this enclosure was held by the details of the Division which were left as a guard over the sick and baggage from the 25th September till the arrival of the reinforcements from Cawnpore.

The minimum strength kept on actual guard or picquet duty consisted of a guard over the main gate of 1 sergeant, 2 corporals, and 16 privates, and of picquets in the east bastion and in the mosque on the west side of the high road, composed of 1 sergeant, 1 corporal, and 6 privates respectively. Occasionally these posts were strengthened, and usually during the night a subaltern was sent to both the main gate guard and the mosque picquet. A proportion of Officers and men were told off as inlying picquet, the remainder, whenever things were quiet enough, being allowed to unrig, but no one to leave the enclosure. The sentry posts were eight in number: one in each of the four bastions; at each of the two gates; at the mosque and in front of the house or palace. A look-out post was established on the flat roof, from which an excellent view was obtained. There does not seem to have been any direct communication by means of patrols between this little fortress and picquet No. 4. None was required during the day, and as the intervening space was constantly swept by the enemy's fire,[1] the additional security which during the night would have been obtained might not have counterbalanced the certainty of frequent casualties.

From picquet No. 4, protected, as will be seen from the sketch, by an earthwork, the range of view was so clear to the front that during the day no advanced sentries were considered necessary. At night, however, in addition to the marksmen in the rifle-pits, this picquet and the intervening space towards No. 5 were covered by a chain of 4 or 5 double sentries posted about 200 yards in front of the abattis. Visiting patrols were sent out every hour.

No. 5 post, fortified in front and on the left face of the village, as will be seen from the sketch, possessed a tower surmounting one of the houses in the angle, and on this was stationed a look-out man with a powerful telescope. Sentries were posted at either extremity of the breastwork. A clump of trees near the north-west angle, obscuring the view in that direction, was occupied during the day by a corporal's party which furnished a sentry at the further edge. These were withdrawn at dusk. The outskirts of the village and the ground in front of the abattis communicating with picquet No. 4 were constantly patrolled.

Additional means of security during the night, as well as of communication between the outposts and the camp, were provided in this wise: picquet No. 3 furnished at night a double vedette who patrolled along the high road close up to the Alum Bagh with orders to keep a good look-out to their left. The Jellalabad half-way picquet similarly threw out a vedette to patrol to the south angle of the Alum Bagh, and one to patrol towards camp till met half-way by one from the cavalry of the right wing. An inner cordon was also furnished by the quarter and rear guards of battalions in camp of single sentries posted at nightfall by the subalterns of the day.

At sunset also there came on duty daily an Inlying Picquet from each infantry brigade of, at first 150, latterly 100 men. These had duties to perform somewhat intermediate, if the outpost system then in force be compared with that now prescribed by regulation—between those of supports and of reserves to the picquets. They paraded when coming on duty, and again at sunrise before dismissal, either in front of the centre for the inspection of the Divisional Field Officer, or in front of their respective wings for that of the Brigade Captains of the day. They remained during the night accoutred. The cavalry also kept ready an inlying picquet of 20 men with horses saddled.

[1] An Artillery Officer noted, during a ten days' tour of duty at this post, that the enemy fired at it 2,107 cannon shots, of which 360 either struck the building or fell in the enclosure. The only casualties, however, were three men wounded. A Field Officer kept a record during a seven days' tour which shows a daily average of 126·5 shots aimed at, and 33 hitting the enclosure.

A close examination of the dispositions now studied will show that the same spirit is to be traced throughout as has in the latest regulations for this branch of field duty prescribed the partition of an outpost force into the three distinct bodies: picquets, supports, and reserve. The two detachments in the fortified enclosures may be looked on as strong picquets with their supports close to them, as is directed by the Field Exercise of 1877 for cases where the latter can be of greatest use when at the same posts as their picquets. Posts Nos. 3 and 9 were really supports to the left front and to the rear picquets as regards the positions they respectively occupied, and if the Officers commanding these were not authorized to advance from their posts to reinforce any of the picquets when attacked, this want of mobility was rapidly to be supplemented by the readiness to turn out of the inlying picquets in camp.

The Gross of the Division itself, that is to say, so much of it as remained unaccoutred in camp, was close enough to the outpost line and sufficiently well practised in rapidly turning out to come under the rule which dispenses with a separate reserve when the body of troops to be covered can within a short time be formed to resist an attack.

The Field Officer of the day, besides inspecting the details from the two brigades on their mounting at sunrise, had to visit the picquets by day and by night, though there are on record instances when he was exempted from this duty as regards some of them. He had also a general superintendence of the camp, but was assisted in this duty by a Captain from each brigade. His orderly private had, when coming on duty, first to make himself acquainted with the tent at which the Field Officer might be found, then to remain at the quarter-guard of the right battalion of the left brigade, to which post reports from the outlying picquets were to be brought by mounted orderlies.

The principle prescribed by regulations now in force of supplying the outpost bodies by complete units, such as battalions, companies, or sections, was not, it may be observed, followed in this Division, and it may be taken as certain that it would not have been possible, consistently with an equal distribution of this protracted hard work among battalions, some of which were reduced to skeletons, to carry out the rule otherwise so important. The daily or weekly quota to be furnished from brigades was, by the Assistant Adjutant-General, and from the battalions of each brigade by their respective Brigade-Majors, fixed from time to time proportionally to the states of Officers and men available for duty. Thus, as will presently be seen from the notice of one of the enemy's attacks on the position, each brigade had on turning out nearly the same number of bayonets in the ranks. There was, of course, the disadvantage that the Officers and men of different regiments sometimes went on the same small post together. The proportion of Officers to rank and file sent to the outposts was also in many cases small, it being necessary to retain a large proportion in camp for the performance of the orderly, court-martial, and such like duties which are nearly as apt to accumulate in a standing camp as in an ordinary garrison. Frequently two Officers only were sent with 100 men.[1]

[1] When the steady flow of reinforcements from England enabled the Commander-in-Chief to organize an Army Corps for the siege of Lucknow, instructions on this subject were issued in general orders. One of the paragraphs was as follows:—"Besides the guards and outlying picquets every regiment in the force, cavalry or infantry, will keep either a troop or company on inlying picquet. This is to be an entire troop or company . . . . Officers commanding regiments are to understand that all duties requiring a force which exceeds in strength a subaltern's party are to be taken by entire companies. Companies are not to be broken up, but they are to proceed on every description of duty, whether in the trenches or on picquets,

A *résumé* of the various posts will show approximately the strength of the troops left available, in case of the position being attacked, to operate against the enemy either by reinforcing a threatened point, or without abandoning any part of the outpost line by meeting his advances with counter-attack.

There were on outpost duty by day :—

	Infantry.	Cavalry.	Artillery.
Jellalabad Fort	200	7	[1]
Alum Bagh	225		
10 outlying picquets	251	18	
Total	676	25	100
Increase by night :—			
At the centre, front, and rear picquets	25	7	
Inlying picquets	200	20	
Total on outpost duty at night	901	52	100

The total strength of the division being 4,000, it would appear, therefore, that by day the fraction subtracted for outpost work was exactly one-fifth, but that during the night the number of men employed with greater or less deprivation of rest in watching for the security of the remainder exceeded slightly one-fourth of the whole body of troops.

But before the exact strength can be ascertained which at any time remained, so to speak, in the General's hand, other deductions have to be made. The average number of men in hospital was 270, and for the interior duties of what was from want of carriage a standing camp, as also for the protection of the cattle sent out to graze, about 200 men mounted daily the brigade and regimental guards, and the necessity to send fortnightly an escort with a convoy to and from Cawnpore, caused a farther deduction of about 450 men during the greater part of each month. Consequently, as stated in the despatch in which the General towards the close of these operations furnished to the Commander-in-Chief a summary of the work performed by the troops, there remained free for action at any time little more than 2,000 of all arms.[2]

as entire bodies without attached men from others, and under their own Officers. If a subaltern's party is required for the trenches or picquets, it will be taken from one company." Battalions now taking the field with unimpaired strength had no difficulty in complying with this order, but the spirit rather than the letter had to be followed by one attenuated battalion of the 1st Division, the ten companies being for tactical purposes combined as five double companies, so that one "division," as it was then called, was always on inlying picquet, and when a company was called for a "division" was furnished. Paucity of Captains allowed the system to work without friction.

[1] The quota of artillerymen either sent weekly with the two strong detachments, or daily to any of the outlying picquets, cannot be ascertained, but as a letter from the General to the Commander-in-Chief of the 16th December alludes to one of the field batteries and two 18-pr. guns as occupying Alum Bagh, and another field battery as being distributed amongst the picquets, the total number of artillerymen permanently on duty may be underestimated.

[2] His letter of the 16th December, already quoted, gives the number of all ranks of infantry as 3,062, on outpost duty 999, leaving 2,063 in camp, and after deducting guards, &c., 1,600 available while a convoy escort was absent.

Reinforcements, however, in the shape of recruits for the infantry battalions, had added to the Division 340 men by the 22nd December, when a determined attack was made on the position, and the increase had amounted to nearly 600 on the occasion of another attack on the 12th January. Still later, when the successful issue of the more distant operations on which the Commander-in-Chief was for some time engaged permitted him to concentrate a large force for the capture of the rebel city, additional reinforcements, particularly of an entire battalion of sappers and of several squadrons with a troop of horse artillery, joined the Division, while a series of posts established along the high road to Cawnpore relieved it from furnishing convoy escorts farther than half way to the 12 miles distant bridge at Bunnee.

As has been stated, the line of resistance to the enemy's attacks was from the first that occupied by the outposts. Orders were therefore issued warning the Officers in command that it was their duty to defend their posts by aid of pickaxe and shovel as much as by musket and bayonet, and they were moreover forbidden to abandon without orders any of the villages thus held, being promised timely support in case of being attacked. Some idea of the defences provided for the picquets, and of the obstacles placed in the intervening spaces, may be obtained from the sketch. The occupation of the posts being protracted, sanitary precautions were also prescribed.

To the advanced party of marksmen which by night held the rifle-pits in front of picquet No. 4, special instructions were issued: "To lie close, and, if not detected, to let the enemy get near before firing; to watch for the embrasures of his batteries indicated by the flash of discharges; try the range and fire on the gunners when loading; to keep away from the ruins so as to avoid splinters when round shot might strike these; if compelled by an attack in force to retire, fall back by twos and threes from pit to pit, keeping up a fire, and so on to the picquets, but if the enemy's fire should be directed on the space between the pits and the battery, then to fall back through an opening in the abattis."

The advanced posts, at least those of the Alum Bagh and to the left thereof, being in immediate contact with the enemy—700 to 1,500 yards of his trenches—the exchange of shots was too frequent an occurrence to cause a turn out of the Division whenever firing was heard. The orders in view of this measure being called for were that on the "Alarm" sounding at the General's tent the signal should be taken up by battalions; all guards and outlying picquets should stand to their arms; the inlying picquets form up in front of their brigades, the remainder of the infantry accoutre and wait for the "Assembly." On the latter sounding, brigades to form in line in front of their respective camps. For the cavalry the special instructions were: On the "Alarm" to saddle; on the "Assembly" to mount and form line as follows: Military Train in front of their own camp and facing to the general front; the other small bodies to form together with their front to the rear of the position and their right resting on the high road clear of the camp of the Sikh cavalry. The artillery were on the "Alarm" sounding to harness horses and yoke bullocks; on the "Assembly" to draw up on their own ground.

The careful student or the instructed critic might well be dissatisfied with the foregoing account of the precautions prescribed in this Division for insuring to the troops as much repose as could be combined with perfect readiness to meet an attack, if, before describing how these dispositions were put to the proof by the efforts of the enemy, no mention were made of the measures adopted for ascertaining the movements and intentions of the latter in sufficient time to forestall him at a decisive point.

For this purpose none of the actual circumstances favoured a resort to reconnoitring on an extended scale. On the left front of the outpost line the troops were in almost uninterrupted contact with the enemy; in fact, towards

the close of the operations in as close proximity to his trenches as are usually the advanced parties when ground is first broken by a besieging force. By day no patrolling to the front was necessary; by night it was required only when the enemy was quiet and to a short distance from the chain of sentries, so as to make sure that a sudden rush was not preparing on the particular picquet. On the right front the presence of the enemy was by no means so uniform; the line of defences from which he was wont to issue for an attack was more distant and less distinctly marked. In this direction and to both flanks constant reconnoitring by patrols of various strengths would in ordinary warfare have been essential, but the peculiar conditions of the operations under notice at the same time imposed a limit on the use of such parties, and supplied a substitute which obviated the necessity to increase the number of men employed on the service of security. With one-fourth of his troops already on outpost duty, with but a handful of cavalry to nurse for an opportunity of decisive action on ground so admirably suited to that arm, the General would have found his military strength much impaired had he been compelled to rely for information on such increased exertions by the Officers and men of his numerically weak Division, and had his own diplomatic talents and high personal reputation amongst the rebel population not supplied the want. The British Government had partizans in the city; he himself had formerly exercised, and had recently been reappointed to, the chief civil authority over the province, and he had during a prolonged and varied service been wont to exercise much influence over all classes of the natives of India. Consequently, he was able before long to organize an admirable Intelligence Department, at the head of which was an Officer of long experience in Oude, and thereby to receive a daily report of the doings within the enemy's line, and of his plans for issuing forth to attack the position, or to operate against the line of communication. The outposts had orders not without cause to arrest unarmed natives seeking to come into the British camp, as it was an object to encourage the inhabitants to bring in provisions. This comparative freedom of intercourse facilitated, no doubt, the passing to and fro of spies, not only on, but from the enemy; and it is stated in the General's summary of the operations that the rebels had knowledge of the departure of the convoy escorts to Cawnpore. The latter information, however, might have been obtained by them without access to the camp, and in any case the balance of advantage from the circulation of intelligence was in favour of the British commander.

Such was the position, such were the strength and composition of the troops holding it, and such the measures adopted for their security in camp, and for obtaining information as to the movements and intentions of the enemy. But although the object for which this Division had been left in observation of the city of Lucknow prescribed a defensive attitude, and although the dispositions which have been described were resorted to as measures of defence, the General's plans by no means excluded a recourse from time to time to the offensive, as will appear when the tests to which these plans and dispositions were exposed are considered by the reader. There were limits, however, to offensive action imposed by the disadvantages under which the British laboured of operating from open ground, of numerical inferiority on the spot, of inability to count on reinforcement, and of want of that mobility which a tactical unit in the field usually possesses—as against the advantages which favoured the rebels, of strong cover as their tactical base, of numerical superiority in first line, of still greater and ever-increasing strength in second line, and of mobility, especially as regards the ordnance they could bring into action. A movement in advance from the more exposed section of the outpost line[1] would at any time, no doubt, have speedily resulted in the entry into the enemy's trenches and batteries of the unhit balance of

[1] Alum Bagh to picquet No. 5.

any British detachment ordered to double across the open from the picquets, but what farther result could be hoped for to compensate for the unavoidable reduction in fighting strength? Could the capture of the guns be reckoned on, or would it be possible to permanently deprive the enemy of the artificial cover he had provided? The General had reliable information that the rebels—setting such semi-superstitious store by the possession of artillery as seem to do many half-civilized belligerents—kept the gun-teams of horses and bullocks ready harnessed for withdrawal of their field-pieces, and he felt that the exertions of his men would be wasted, and that the losses to which they would be exposed by fire from the enclosures which supported these trenches from the rear would by no means be compensated, if he were to cause them to demolish the earthworks, since the enemy had any amount of labour available for speedily restoring them. In reply, then, to a suggestion from Army Headquarters that he should capture the batteries which annoyed his front, the General protested against being called on to undertake an operation likely to entail heavy loss, and promising little lasting advantage. Where, after the successful delivery of the first shock of an attack, farther pursuit was impossible, he judged that offensive action was under the circumstances misplaced, and throughout the course of the maintenance of his position, as long as he could count on no reinforcements, he steadily observed this principle. But to cases in which the enemy issued from his cover to attack or threaten the flanks or rear of the camp or the line of communication this rule did not apply, and, as will be seen, a vigorous offensive was then resorted to without, at the same time, relaxing from watchful and, when necessary, stubborn defensive in front. For movements against the left of the British position the ground offered little means of concealment, and it was especially suited to the action of cavalry. On this flank the enemy used that arm largely, and against his demonstrations in that quarter the action of the only horsed battery with the Division, escorted by a handful of cavalry, dashing forward to a considerable distance beyond the outpost line, was frequently brilliant and effective; but there was little scope for meeting surprise with surprise, and for thereby cutting off the retreat of the rebels' more advanced parties. On the other hand, a movement from the line of the canal against Jellalabad, or the space intervening between that fort and the camp, necessitated either the coming into a re-entering angle[1] between the two strongly garrisoned enclosures, or the leaving a wide interval of ground between the cover which formed their base, and their advanced detachments operating against or beyond the east face of the front. On this ground, equally suitable for the action of cavalry, villages and groves were more frequent. While these served the enemy as points of *appui* in which to establish his infantry supports, they had the effect of enticing him farther from his base, and of concealing the movements of the British cavalry, especially at a time when the General, reinforced as regards that arm, was able, by rapidly cutting off the retreat of the enemy's fighting troops, to make him pay for his momentary rashness.

The first notice of offensive action by the enemy to be found in the correspondence to which the compiler of this notice has had access, is in a letter, dated 1st December, to the Officer commanding the bridge post, 12 miles in rear, warning him that cavalry and guns had been moving to the rear by a road which led in the direction of Cawnpore, passing about 2½ miles to the west of picquet No. 6. The despatch of a temporary reinforcement of 50 infantry[2] from the left brigade and of 20 cavalry—the latter, however, to

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On the 22nd a movement against the position itself brought about an action of sufficient importance to merit notice in a despatch to the Commander-in-Chief. The General had been informed two days previously by his spies that the enemy contemplated surrounding the position, in order to cut off supplies, stop foraging, and intercept communications. On the evening of the 21st further intelligence was received that a force of about 4,000 infantry, 400 cavalry, and 4 field guns, was in position to the right flank, between the village of Budrookh and that of Guilee, which latter, not marked in the sketch, is about a mile east of the former. An order was sent to the Field Officer commanding at Jellalabad to draw in his picquets at 5 A.M. next morning, and to move out with 100 infantry, 2 guns, and his small party of cavalry at 5.30 A.M., into a position threatening the enemy's line of retreat, there to remain concealed until any fugitives should be perceived who could be cut off, or on whom loss might be inflicted by the guns, when the party should advance into the open, but not so far as to let the enemy get into the left rear. The General himself moved out at 5 A.M. with 1,227 infantry (composed of detachments from six of his battalions), 190 cavalry, and 6 guns, formed in two columns, with a reserve, and passing through the outpost line between Alum Bagh and the eastern marshes, dashed at the enemy and compelled him to abandon his guns before he could accomplish a retreat in disorder to his suburban cover. Meanwhile the troops left within the circuit of the position checked a disposition of the enemy to push forward with skirmishers against the left flank until the return of the remainder of the Division caused him to renounce the design.

The next occasion was on the 12th January, 1858, while a convoy, escorted by 450 infantry, 80 cavalry, and 4 guns—all furnished by this Division—was on the road. The General had information of the projected attack for some days beforehand, and on the eve of the design being executed was in possession of accounts definite enough to cause him to expect the enemy at sunrise. He caused the troops to breakfast at daybreak and had everything ready, including such tactical dispositions as were necessary. What these were as regards reinforcing the outposts is not described in detail, beyond that incidental mention occurs of the picquet which closed the defile between the two swamps towards Jellalabad having been completed to 100 men with 2 guns. It is also on record that the usual relief at sunrise of the picquets, as well as that of the Jellalabad detachment which happened to fall due for that morning, were in orders of the previous evening postponed till 4 in the afternoon. Each infantry brigade was, anyhow, left with the average strength of a battalion, the right numbering 713 and the left 733; the 7th battalion, 100 of all ranks.[1]

Soon after sunrise there appeared on the left front large masses, which gradually spread round the whole front and flanks of the position, extending from opposite picquet No. 8 to near Jellalabad, and displaying a strength which the British General estimated as at least 30,000.

The enemy, first of all, more closely threatened the left front and flank, covering his movement with skirmishers. While the right brigade stood fast in front of the camp, and the volunteer and native cavalry were drawn up to protect the rear, the left brigade extended two battalions on the flank of the left outposts with the 3rd in reserve, four horse artillery guns being directed

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with an escort of the Military Train to the left rear, opposite which the enemy showed strongest in cavalry. The guns dashed forward very boldly and by their fire, opened at a range of 500 yards on the hostile masses, turned his right flank and drove him back with loss on the city. At or about the same time the united fire of the guns at the Alum Bagh and at the two picquets to the left front deterred his skirmishers from closing on the outposts, except that in front of picquet No. 4 an advance was made into the trees, from which, however, they were speedily driven by skirmishers from the picquet.

Meanwhile word was brought to the General, who was directing the operations on the left flank, that Alum Bagh and Jellalabad were threatened. Three horsed guns, supported by a dense mass of infantry, had been brought against the Jellalabad half-way picquet, and to meet this attack the General at once moved with two of the skeleton battalions from the right brigade and two guns, got on the flank of this body, and compelled it to retire, so as to come under the fire of Alum Bagh.

Another onset was made on the left, mainly by cavalry, who galloped up to the rifle-pits, but were driven back in confusion by the guns at the two picquets. Again, on the right an advance was made under cover of artillery fire on the space between the camp and Jellalabad, but was repulsed by the guns at the half-way picquet.

What cover the enemy found available in the immediate front of Alum Bagh he also lined and filled with infantry, though he could be seen to suffer severely from artillery and rifle fire. An attempt about noon to advance therefrom across the open at once failed. By 4 o'clock the enemy had retired from the undertaking, having caused no greater loss to the British Division than that of six wounded, among whom was included an Officer.

Intelligence that the enemy was sending large detachments in the direction of the bridge post on the Cawnpore road called for the despatch the same night of 100 infantry thereto.

The demonstration of this day—for such the British General regarded it, rather than as a real attack—had been happily met, but the numbers which the enemy had displayed, the information that at least an equal strength of armed men had remained in reserve within the city, and the reflection that a more determined attack might find him unwarned or might be pushed home during the night, caused him grave anxiety, to such an extent as to lead him to forward both to the Commander-in-Chief and to the Government at Calcutta a statement of his difficulties and the expression of a hope that, if the siege of Lucknow were to be indefinitely postponed and his Division to continue in its actual position unsupported, he might not be held responsible for disaster. At the same time he informed the Officer commanding at Cawnpore that if a battalion, or even half a battalion, could be spared from that post and some guns of position forwarded from the park in course of formation, such reinforcement would enable the Division both to keep the enemy at bay and to operate more freely beyond the outposts.[1]

[1] It does not come within the scope of this notice to discuss the soundness of the strategy which left this body of troops immovable and unsupported for so long a period in the presence of vastly superior forces, but one reason for withholding support as well as for leaving to the advanced Division the duty of furnishing convoy escorts along the line of communication must be cited as conveying at the same time a tactical lesson.

In a letter dated 23rd December to the General commanding at the Alum Bagh, the Commander-in-Chief wrote that he had proposed, on the occasion of his own departure for operations elsewhere, to employ two battalions "as a movable column in the neighbourhood (of Cawnpore), and at the same time to serve as a support to your force, and to enable one of the corps to proceed to your assistance in case of your requiring it, but they have made the intrenchment of such an extent as to

A more serious attack was made four days later, with a less display of numbers but with greater boldness and persistency.[1] In the morning a body of the enemy, of which the strength is not estimated in the despatch, led by a Hindu fanatic who was attired to represent the Monkey-god, made a sudden set on the Jellalābad half-way picquet, at the time commanded by a subaltern, and were received by a fire of rifles, which drove them back with the loss of their leader, who fell mortally wounded into the hands of the picquet, and of more killed and wounded than the enemy could carry off. Two 9-pr. guns, brought up from camp under the escort of a subaltern and twenty-five men from the right brigade to support the picquet, compelled an abandonment of the cover in front which the enemy had used as a point of *appui*. The left front and flank were threatened throughout the day, and after dark the enemy's infantry assembled in great strength in front of picquet No. 5, at the time commanded by a Major (having been reinforced up to 200 men), who allowed the rebels to approach within 80 yards, and then gave them grape from three guns with bullets from his rifles. As they withdrew with loss, he followed them up with shells from a mortar. Attempts by cavalry against the left rear had been watched and checked throughout the day by four horse artillery pieces, escorted as usual. The Division had a bombardier killed and eight men wounded.

The successful repulse of this attack and the prospect of the Commander-in-Chief soon moving in the direction of Lucknow relieved the General of much anxiety; but still he felt it necessary to warn Headquarters that, owing to the enormous numbers of the enemy and the extent of his position, he was obliged to keep his men in readiness, and as there was a perceptible change in the temperature the hospitals would begin to fill under so much exposure. Moreover, that unless reinforced ere compelled to detach another convoy, he would have hard work in repelling the incessant attacks of the increasing hosts of the enemy, headed by the many territorial Chiefs reported to be in the city or immediate vicinity.[2]

The Intelligence Department had about this time news that a grand assault was being planned, and that a particular day, the opening one of a festival, had been fixed for the purpose. The affair, however, did not come off, much to the disappointment of the General, who, having been rejoined by the convoy escort and reinforced by some cavalry, had hoped to give the rebels a severe mauling and to get some of their guns. The spies reported a day or two afterwards that the enemy's troops and guns had taken up their positions during the night; that in the morning their Generals had ensconced themselves at a respectful distance in their rear, that the men were accoutred, and all was apparently in readiness. They did not advance, however, and the Generals sent for the Commanding Officers of Divisions, &c., to inquire the reason. They replied that they would attack, since it was better to die fighting than to be hanged, but that they must have their pay first.

From this period till the 15th February the rebels are described as evincing a nervous restlessness, which betrayed itself in constant assemblies of cavalry

make the force to be left at Cawnpore little more than sufficient to occupy it in a very slender manner."

[1] The convoy from Cawnpore reached the bridge post at 2 P.M. on the 15th, and was to have halted there for the night, but was ordered to resume the march that evening, and starting at 7 P.M. came into camp at 2 A.M., so that the escort was available towards repulsing the attack of this day.

[2] It must not be supposed that the General allowed his anxiety to be shared by his troops. Seldom has duty of any sort been performed with greater confidence and cheerfulness by all ranks. In the intervals between the attacks, as much as possible was done to relieve the monotony of camp life. Officers off duty were allowed to go for short distances shooting, and to get up races. During Christmas week the usual sports were organized for the men.

and infantry, and by demonstrations of attack, which were instantly stopped by a few rounds from the guns at the outposts. About this time the concentration of troops and material for the projected attack on the city had commenced, and on the Cawnpore road stood a succession of detachments at intervals of an easy day's march, somewhat resembling the system of stages by which a German field army maintains communications with its base. The continued movement of troops and stores was known to the enemy, and caused the activity on his part which, though occasioning few casualties to the British Division, constantly necessitated its turning out and remaining under arms.

It was during this interval of comparative inaction that, in consequence of information that the enemy's positions were greatly weakened in troops, large numbers having left the city to meet the different advancing columns of the Commander-in-Chief's army, the General commanding at Alum Bagh felt satisfied that by a simultaneous movement from his right and left he could take in reverse the batteries in front, which played on the Alum Bagh and the advanced posts, capture and destroy the guns, of which he understood seventeen to be in position on the south side and five on the north bank of the canal. He hoped to be able to accomplish this with little loss, provided the operation were undertaken before the approach of the other columns and the consequent return of the rebel detachments to the city; but as he felt that he might thereby be anticipating a move which should form part of the combined operations, he referred his proposal to headquarters, where it did not meet with approval.

On the 13th February the news from the "Court Journal," as the epitome of daily intelligence was styled in the British camp, was to the effect that an attack at all points of the position was planned for the 15th. It seemed probable that under the mingled taunts, promises, and threats of the so-called "Queen Mother" the rebels might be induced to make one desperate last attempt, and that if she herself—"the best man of the lot" as the General styled her—should come out, as was expected, it was possible that the whole force then assembled in Lucknow, regular and irregular, might be inspirited to come to the scratch. The General, with the view of being able to inflict a heavy blow, requested when passing on this intelligence to Army Headquarters, by this time returned to Cawnpore, that a battalion which had been withdrawn from his command in exchange for a raw one of native sappers might be countermarched to rejoin him. The request was complied with, but next day it was reported from the city that the expected movement of the rebels had been abandoned, and a message was sent to the bridge post for the battalion to resume its march on Cawnpore.

Notwithstanding, however, the failure of the rebel court to induce their troops to come out in mass, a demonstration took place on the day in question, concealed to some extent by a violent dust-storm, round the left of the British position against the high road along which a convoy was at the time marching. The horse artillery, as usual, escorted by cavalry and dashing well out, supported also by the nearest battalion of the left brigade, sufficed to disperse the enemy's cavalry and infantry, wounding their chief, a Mahomedan dignitary who rode in a litter. The Division had only one man wounded.

Next day, the 16th February, the rebels, while they threatened as on former occasions the left flank with cavalry and infantry, filled with the latter arm their trenches[1] and the groves in rear of these, but although they

[1] From what may be termed their primary line of trenches, of which the right rested on the village Bura (see sketch), they had by this time pushed an extension to a point north-west of picquet No. 5, and from that point had by means of a zig-zag approach provided cover for their attacks to within close proximity of that post.

began their demonstration in the morning, they did not muster resolution enough for the attack till about 5.30 P.M., when they suddenly issued in clouds of skirmishers against the guns of the centre and left, and in large bodies advanced on the village where picquet No. 5 had been reinforced to a strength of 200 men under a Lieutenant-Colonel. This outpost had three men wounded before they repulsed the enemy. For a couple of hours after dark a heavy musketry fire was kept up against the north and east faces of the Alum Bagh without occasioning any loss to the defenders, who aimed grape and shrapnel at the line indicated by the flashes of the rebels' muskets.

On the 17th, while a partial advance against the right and left picquets was repulsed by artillery fire, some 2,000 infantry, sent by the enemy towards the right rear, withdrew towards the city on the appearance from camp of a couple of squadrons and two guns.

The information received at this time was to the effect that the rebels purposed continuing these attacks daily and from all quarters. Consequently the picquets had to be maintained at abnormal strength, and the troops were harassed by constant turns out.

For instance, picquets Nos. 4 and 5, which at the outset had been each fifty strong, had their numbers from time to time increased, so that at one time the former consisted of as many as 100 men under a Captain, and the latter of 300 under the command of a Field Officer.

In échelon behind the line of these two picquets—both of which, it will be remembered, were armed with guns—was established a fresh battery guarded by an escort or picquet, as it was termed at the time, of from twenty to fifty men under a subaltern. Two guns were sent to picquet No. 6. The Jellalabad half-way picquet was furnished from camp; strength: 2 subalterns and 50 infantry. The Alum Bagh detachment was increased to 275 rank and file. *Per contra*, the augmented strength of the advanced posts in front, and the additional security given by the approach of troops along the Cawnpore road, admitted of the reduction of picquets No. 1, 3, and 9 to the strength of ordinary camp guards: 1 non-commissioned officer, 12 or 18 rank and file.

The proportion of men at the outposts to those in camp was, however, now so great that the reliefs of many of the picquets could only be effected every three days, sometimes only weekly. Frequently that of one strong picquet or detachment had to be postponed, and the men who had come off one post in the morning to mount another in the evening.

The General again remonstrated against his troops having under these circumstances to furnish the convoy escorts half way to the bridge post in rear.

On the morning of the 21st February, while the strength of the Division, particularly in cavalry, was reduced by such an escort, a simultaneous movement took place threatening both flanks as well as the whole front of the position, the points actually attacked being the north-east angle of the Alum Bagh and the fort of Jellalabad with the half-way picquet. The troops holding these posts were reinforced, while a body of about 250 cavalry with two guns were sent to the rear of the fort, and coming suddenly on about 2,000 of the rebel cavalry, drove these back on their infantry, some 5,000 strong, which latter, after advancing to within range of grape, retired with loss. The left flank was threatened by from 8,000 to 10,000 infantry with 500 cavalry, against which force were sent, with the usual result, four horse artillery pieces, escorted by about 120 troopers, and supported by the available strength of the left brigade. The Division had 9 men wounded, while reports from the city gave the loss of the enemy as 60 killed and 200 wounded in front of Alum Bagh, with some 80 or 90 casualties near Jellalabad.

A few days before the 25th the first instalment of troops composing the force which the Commander-in-Chief was concentrating for the capture of

Lucknow arrived within the lines of this Division and were temporarily at the disposal of the General. These consisted of a battalion which had for some days past been distributed on the line of communication with Cawnpore, of several squadrons, and of a troop of horse artillery. By this time also a large quantity of combustible stores had been collected in the fort of Jellalabad.

Knowledge of the last-mentioned arrival is believed to have determined the enemy to direct against the right flank the principal attack on this, the last occasion of his attempting to force the isolated British Division from its position. In the early part of the day his demonstration against the front and left was of the usual nature: filling the trenches and sending large bodies round the flank, but flinching from artillery fire. Against the right flank he moved out a force of 30 battalions—of which the numerical strength and the standard of training cannot be given with any approach to accuracy—1,000 cavalry, and 8 guns. Half this body with two guns advanced close on the fort of Jellalabad, which they commenced shelling, while the remainder in reserve occupied villages and groves in advance of their own outworks.

Soon after 10 A.M. the General moved out with the available infantry of the right brigade and the increased force of cavalry which he now had at disposal. The infantry did not come into effective action, so precipitate was the retreat of the enemy on receiving the fire of the horsed guns, and on becoming aware of two bodies of cavalry, of which one, advancing from the left of the British column, threatened to cut off his retreat, while the other, having made a détour by the village of Nourungabad, came on him from the opposite direction. Still there was time for the centre body of cavalry which headed the infantry column to dash into the retreating ranks and to capture two guns. By 1 P.M. this affair was over, but about 4 P.M. a fresh attack was made against the left, the rebels advancing to within grape and musketry range, but being repulsed with loss, especially from picquet No. 5. Firing was renewed from time to time during the night as the enemy sent forward parties to cover the removal of his dead. His loss throughout the day was reported afterwards to have been from 400 to 500. That of the British Division came to 5 killed, and 35 wounded, though the latter item included some scratches. It was observed that the rebels on this occasion showed more individual tenacity than previously, those cut off by the cavalry discharging their muskets, then throwing these away and defending themselves with their swords.

An attack was expected on the 29th, but did not come off.

On the 2nd March, the advance of the Commander-in-Chief with a second Division of infantry, a brigade of cavalry, and four batteries from the Cawnpore road by a line leading east of Jellalabad into a position of which the right rested on the River Goomtee behind Dil Khoosha, followed on the two next days by the closing up of the siege train and of a third Division of infantry, caused the withdrawal of the bulk of the rebel forces to the extensive defences which they had constructed along and in advance of the eastern end of the canal, and thus removed the pressure on the front[1] of the 1st Division, which had stood for three months unsupported. It had been for some time previously made movable by provision of carriage for baggage and tents, and it was now gradually reduced by the withdrawal from its organization of the greater portion of the cavalry, of which part was sent to preserve communication between Jellalabad and the Commander-in-Chief's

[1] On the 3rd, however, the enemy were in some force to the left front and flank, so that the General thought it right to call the attention of Headquarters to this fact, and to report that, being for the time short of cavalry, he might find it difficult to protect the line of communication as well as his own camp.

camp, while the remainder, made up by fresh arrivals to the strength of a brigade, was extended westward to watch the exits from the city in that direction—and by the successive despatch of battalions and guns to reinforce the main attack from the east. The General was summoned on the 5th to conduct with other troops a turning movement on the north bank of the Goomtee. In his former camp there remained on the 12th but one brigade of infantry, and on the 16th only two battalions with the horse battery.

Meanwhile the advance, from the eastward, of the army by a movement in échelon from the right, as the intrenchments and palaces held by the rebels were successively turned or stormed, had the effect of causing the old pressure on the Alum Bagh position to be renewed to a serious extent. On the 15th the Gross of the army was established on a line fronting to the south-west and therefore towards the Alum Bagh, from which post the left was distant a crow's flight of about 3 miles. The space intermediate between the Commander-in-Chief's inner flank and the canal was filled by a body of Nepaulese troops, which had arrived on the 12th as allies against the Oude Pretender, and had come into line with a force of about 9,000 infantry and 24 field-guns drawn by men. On the 15th, one of their detachments after a short fight took possession of the Yellow House (see sketch), a building midway between Alum Bagh and the canal, but withdrew from it after dark without giving notice to the British outposts, who were in the sequel somewhat embarrassed by uncertainty as to whether that point was occupied by friend or foe.

On the 16th, the Commander-in-Chief's right, led by the former General of the 1st Division, gained another mile to the westward, "And in short," as was the language of His Excellency's despatch, "the city was ours." With like brevity it is stated that on the 16th, for the last time, the enemy showed in some strength before Alum Bagh . . . . that the Goorkha leader was requested to move to his left up the canal and take the position; that His Highness executed this very well, and that he seized the positions, one after another, with little loss to himself, the guns of the enemy falling into his hands.

Some details, however, of this, the last brush that took place on the front[1] of the position with which the patient student has now become acquainted, may not be uninteresting. They are produced in nearly the identical words of the Field Officer who commanded in the Alum Bagh enclosure.

Between 8 and 9 A.M., he observed from the roof of the Palace a large body of cavalry coming out of the city, and infantry manning the batteries and trenches along the front of the position. An orderly was immediately despatched to the Brigadier in camp, who in consequence of this and subsequently received information telegraphed in the course of the day to the Chief of the Staff with Army Headquarters:

"The enemy are coming on in immense force—both cavalry, infantry, and field-guns on my left front and towards the dense wood close to Alum Bagh. Nothing seen of the Goorkhas. I have drawn up my infantry and field-guns, and my batteries have opened upon them. I have only 140 cavalry here."

The rebels' movement continued to be observed from the Alum Bagh roof, their cavalry in most regular order proceeding along the rear of their batteries. A few shots were fired from the heavy guns of the outpost, but the range at the nearest point of their line of march was upwards of 2,000 yards. They were accompanied by three horse and two bullock guns, and their numbers were estimated at not less than 3,000 sabres. This cavalry continued their march till they had passed the left flank of the position some distance, and then, developing themselves upon the plain in order of battle,

[1] It hardly needs to be pointed out that the extreme right, including the Fort of Jellalabad, had been for some time past beyond the zone of outpost work.

were seen to charge down in the direction of the village held by picquet No. 5. During this time the batteries and trenches in front of Alum Bagh and of picquet No. 4 had become crowded with infantry. About 1,000 men with colours came out and took position in spite of the fire of the British rifles about 400 yards in front of the mosque picquet, and kept up a warm matchlock fire upon it and the enclosure. Some discharges of grape from all the available guns caused them severe loss, as appeared from the bodies and traces of blood found next morning. The enemy's trenches had on the previous occasion been seen by the Field Officer to be crowded, and he estimated the strength of their infantry in front of him at not less than 5,000. This attack commenced simultaneously with the cavalry charge, and was not abandoned till about noon. As heretofore, the more open left flank was freed by the dash and fire of the horse battery, supported by the available infantry from camp.

Another account, though not entering into detail of the particular posts attacked, states that greater boldness was on this occasion evinced by the enemy than on any former attack, that a charge was made up to the abattis, and that one man was actually cut down within the British intrenchment.

On the following morning the same Field Officer, observing the enemy's works to be apparently deserted, obtained the Brigadier's sanction for a reconnaissance, and with forty men proceeded as far as across the canal, inspecting the batteries and trenches on both banks, and paying a particular visit to one gun which, though the range of over 2,000 yards from the mosque near which it was placed had rendered the missiles all but harmless, had been the noisiest sender of scolding messages to the British, and had been known to our men by the pet name of Nancy Dawson.

It was thought to be within the bounds of possibility that some of the enemy had returned to these works later in the day, for when about 5 P.M. a fine view was obtained from the palace roof of the Goorkha advance, these allies were observed to indulge in a free expenditure of ammunition, the noise of which had the result of drawing to the front all the idlers in camp to witness His Nepaulese Highness's prowess without offering co-operation.

Thus the important duty of covering the Cawnpore road, which still formed the line of communication for the British Army Corps until the course of operations in the city had brought the left forward to the westward of Alum Bagh, was successfully performed up to the last by the remnants of the 1st Division.

The foregoing account has been compiled from the published despatches, from correspondence of the General, lent by Sir Francis Outram,[1] and from materials supplied by Lieutenant-Generals Dodgson and Spurgin, who served in the Division as Deputy-Assistant-Adjutant-General and Brigade-Major respectively, and supplemented from the recollections of some of the regimental Officers. The most vivid and serviceable contribution as to picquet details has been furnished by one who joined his regiment fresh from school during the operations, and had to take his share of duty before there was time or opportunity for him to learn his drill.

It has been the object of the compiler to furnish an example, more particularly of the successful performance of outpost duties, which may be useful to the young Officer engaged in the study of the tactical text-books, and as much care as possible has been taken not to travel into the domain of the historian or of the biographer. Students who wish to learn how the operations of this single Division influenced the course of the suppression of the great Indian Revolt, or how they illustrated the life and character of a

[1] The sketch made at the time by Lieutenant (now Major-General) Hutchinson, Royal Engineers, has been furnished from the same quarter, and slightly altered.

distinguished soldier, must turn to the works of Colonel Malleson and of Sir Frederic Goldsmid. The suggestion has been made, however, that a record should be appended of the troops which took part in this important incident of the campaign.

The composition of the cavalry has been described. The various bodies no longer exist as such, but the compiler hopes that there are still survivors of the twenty-four gallant gentlemen who served in the Volunteer Cavalry, some of them, though commissioned Officers, taking their places in the ranks and performing all the duties of private troopers.

The artillery was made up of a garrison battery of the Royal Regiment, hastily summoned from Ceylon, and mobilized at Allahabad with bullocks and native drivers, of two belonging to the East India Company's Bengal Regiment, and one to the Madras Regiment, both of which have since been incorporated in the Royal Regiment.

The right brigade of infantry comprised the 5th or Northumberland Fusiliers, who still bear the same title. This battalion had been sent from the Mauritius.

The 84th, now known as the 2nd Battalion of the York and Lancaster Regiment, had been brought up from Burmah to Calcutta on the first symptoms of disaffection breaking out in the Native Army.

The Company's 1st Madras Fusiliers, afterwards transferred to the line with the title of "Royal," and subsequently transplanted in name to a cooler climate as the 1st Battalion Royal Dublin Fusiliers, had been brought from Madras to Calcutta on the news being received of the mutiny at Meerut. Both of these battalions had been pushed up by detachments, two of which had, before communications were interrupted by the mutineers at Benares and Allahabad, reached Cawnpore, where they perished on the violation by the rebels of the capitulation of that garrison.

The left brigade was composed of the 75th Regiment, now testing another variety of tactics in the defence of the Red Sea littoral as the 1st Battalion Gordon Highlanders. It had taken part in the siege of Delhi, and in the second relief of Lucknow before joining this Division.

The 78th Highlanders or Ross-shire Buffs, now known as the 2nd Battalion Seaforth Highlanders. On returning to Bombay from the expedition up the Persian Gulf, just as the mutiny had broken out, this battalion had been sent round by sea to Calcutta. It remained in conjunction with the 5th Fusiliers to repel the final attack on the position.

The 90th Light Infantry, now transformed after the precedent of the old 95th, and clothed in the dress and title of the 2nd Battalion Scotch Rifles. It had formed part of the expedition which was, luckily for our rule in India, on the way to China when news of the mutiny was received by Lord Elgin, who at once placed the troops at the Governor-General's disposal.

The 7th Battalion was the Ferozepore Regiment of Sikhs, officered on what is known as the irregular system, that is to say, the companies being commanded by Officers of their own race, the Commanding Officer and Staff alone being English. The fidelity of a detachment of this regiment, holding the main guard of the important fortress of Allahabad, had in the month of June saved that key to the North-West Provinces of India from falling into the hands of the rebels.

The company of sappers with the Division and the 27th Madras Native Infantry at the bridge post on the line of communication represented the faithful army of the Southern Presidency.

Many Officers who were at the time serving in this Division have since attained high rank and distinction. Among them are Lords Napier of Magdala, and Wolseley of Cairo. Survivors of the right brigade will hardly have learnt without some emotion that a fine specimen of an old school of Officers has lately passed away in the person of Sir David Russell.

THE SURPRISE OF FONTENOY-SUR-MOSELLE, JANUARY 22ND, 1871.[1]

Translated from the original, by permission, by Captain J. K. TROTTER, R.A., Intelligence Branch, Quartermaster-General's Department.

[The Translation is not to be issued separately in pamphlet shape, or to appear in any other form than as an integral part of the Journal.—L. A. H.]

THE Surprise of Fontenoy-sur-Moselle belongs to the few enterprises which in 1870–71 were successfully carried out by the numerous bands of irregular French which sprang up in rear of the German armies. At this place, on the 22nd January, 1871, a detachment which had pressed forward from the neighbourhood of Lamarche succeeded in driving off the weak picquet posted for the protection of the railway bridge, in blowing up a pier of the bridge, and thus in interrupting for a short time the main line of communication of the German forces in front of Paris.[2] Although this event remained without any influence upon the main operations, it nevertheless gains in historical importance through its connection with the unsuccessful attempts undertaken, on a large scale, a few days earlier by the Army of the East, under General Bourbaki, to gain possession of the rearward communications of the Germans with their own country.

Moreover, the preparation for and the whole course of the undertaking throw a gleam of light on the generally little known state of affairs in rear of the main armies in the field.[3]

The idea of destroying the railway line leading from Frouard to Paris, which formed the principal means of communication between Germany and the French armies in front of the capital, had been mooted in France at a comparatively early date. It attracted special attention, because before the fall of Metz no German forces of any importance were available to advance in a southerly direction for the protection of that line of railway.

In Bordeaux, in September, the "Légion Alsacienne et Lorraine" was formed with the special object of undertaking railway demolitions. The Defence Committee of the Gironde issued on the 15th October, 1870, for the carrying out of these undertakings, instructions which were to hold good for all irregular corps, but had special reference to the Légion Alsacienne et Lorraine.

The franctireurs of this legion, were, before their departure from Bordeaux, practically exercised in the principal tasks recommended in the instructions. Detachments of the force must also have been attached to the Army of the East, as on the 16th January, 1871, a standard, with the in-

[1] From "Kriegsgeschichtliche Einzelschriften." Herausgegeben vom Grossen Generalstabe Abtheilung für kriegsgeschichte. Heft II. Berlin, 1883. See Nos. CXX, CXXI of the Journal.

[2] Compare German official account (German edition), Part II, pp. 1365–1366. [The English translation of this portion of the German official account is not yet published.—TR.]

[3] Concerning the events leading up to and the carrying out of the undertaking, a French Officer who took part in it has given more detailed information in a small pamphlet: E. Rambaux, "Le Pont de Fontenoy," Nancy, 1873. Information upon this subject is also to be found in the "Histoire des Chemins de Fer Français pendant la Guerre Franco-Prussienne," par le Baron Ernouf. Paris, 1874.

scription, "Légion Alsacienne et Lorraine," was captured by the Prussian troops, at St. Valbert, on the Lisaine.[1]

In the second half of the month of October, the Prefect of the Vosges Department went to Tours, and gave information there that Toul was only weakly occupied by the Germans, and that the neighbourhood was almost denuded of troops; and he begged that a small mixed detachment should be assigned to him, with which he wished to undertake a raid against the railway line which ran past the fortress. The Government delegates of the provinces, who agreed to the plan, declared that they were ready to assign some companies of infantry for the purpose in view, but they were not in a position to detail the squadron which was further asked for. The War Delegate de Freycinet believed that he could only collect twenty-five horsemen, and he dismissed the Prefect with the reply that General Garibaldi would be ordered to place troops at his disposal. Before anything further happened in this matter, however, the fall of Metz ensued and completely changed the state of affairs. Upon his return to his department, the Prefect learned from the sub-Prefect of Neufchâteau that Toul was swarming with troops, and that strong German columns had passed through the departments of the Meurthe and the Meuse. The favourable moment for the intended expedition had therefore passed.

It was the IInd German Army, under the command of Prince Frederick Charles, which, on its march to the Loire, traversed with its left wing the neighbourhood of Toul, Neufchâteau, and Choumont-en-Bassigny. On the 7th of November, at Bretenay, it drove out a legion of mobilized National Guards pushed forward from Langres to the north of Chaumont, which fell back on a detachment of 2,000 men and two guns at Vesaignes, near Langres.[2] For the moment also the idea of carrying out the expedition fell the more into the background, as on the side of the French it was supposed that Prince Frederick Charles had left considerable reinforcements along the line of rail leading to Paris.

But the proposal once mooted had, in the meanwhile, already been taken up from another side. Several men of importance united themselves to form a Military Committee of the Vosges Department, which repeatedly held a formal council of war at Vrécourt, and took into consideration thereat the possibility of destroying either the tunnel of Foug, situated 5 miles west of Toul, or the bridge over the Moselle, at Fontenoy, 4½ miles east of the fortress, or finally, the bridge over the Moselle at Liverdun, 9½ miles east of Toul.

The technical adviser was a chief inspector of the Eastern Railway, who lived at Toul, and repeatedly sent thence to the Committee communications upon the state of affairs upon the railway lines which were being worked by the Germans. He was present also at a Conference at Vrécourt, and supported strongly the project of destroying the bridge at Fontenoy, whilst at that time the majority of the Committee decided in favour of an attempt against the bridge at Liverdun.[3]

This latter proposal was explained by delegates of the Committee to the War Minister Gambetta, at Tours, who encouraged them with the words: "If you succeed in carrying out the undertaking successfully, you will have done just as much for the defence of the country as if our armies had gained two victories."

The delegates returned again in the beginning of November with a proclamation of the War Minister, according to which they were nominated

[1] German official account (German edition) Part II, p. 1114.

[2] Compare German official account (German edition), Part II, p. 391; also "Langres pendant la Guerre de 1870–71," pp. 21, 22.

[3] Ernouf, pp. 73–79.

Plan of the expedition agains

between the 18th and 2

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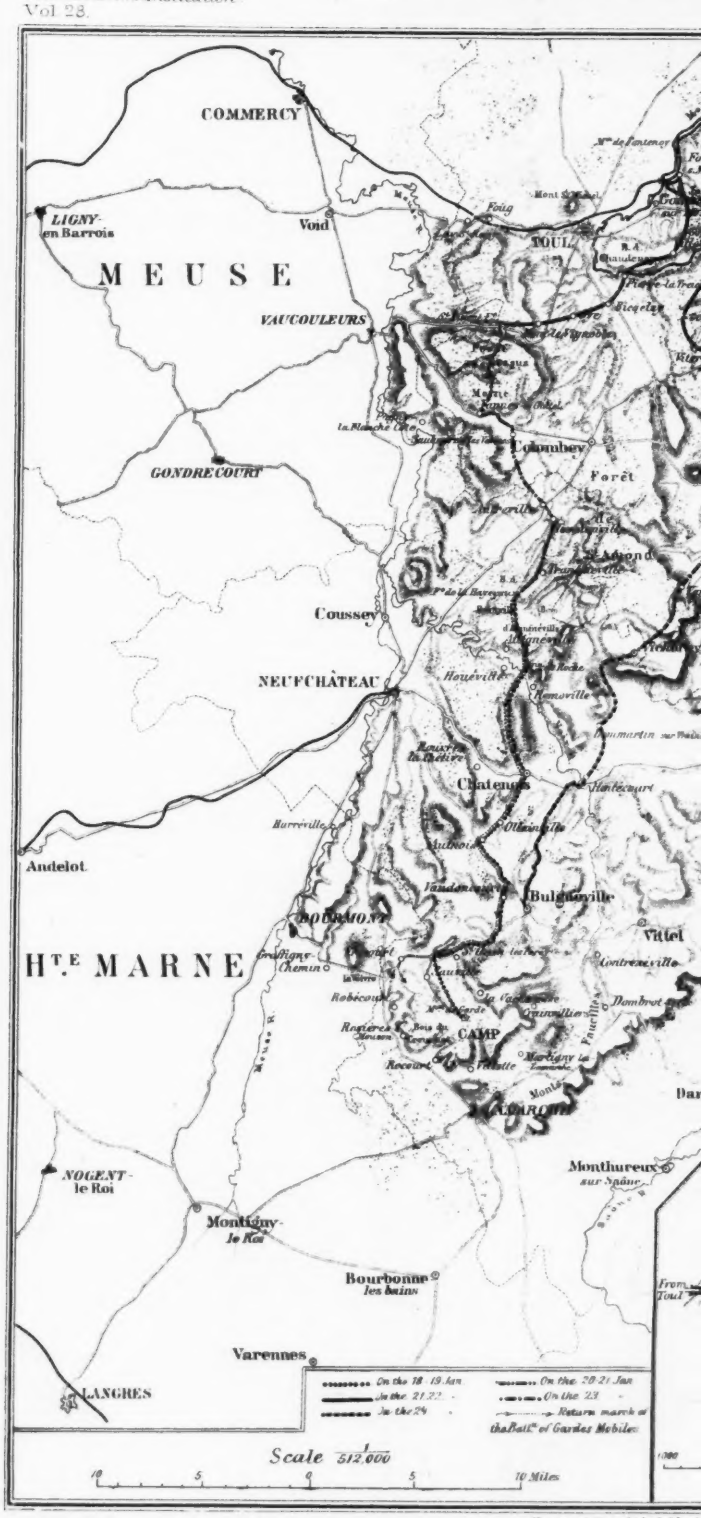


Hanhart Comp. Lith. 5 Martin

n against Fontenoy sur Moselle

8th and 24th January 1871.

Plate V.

members of a Military Commission for the defence of the departments of the Meurthe, the Moselle, and the Vosges, the principal duty of which was to interrupt the enemy's communications with Germany.[1]

This Commission, thereupon, established its permanent seat at Lamarche in the south-west part of the Department of the Vosges, which alone had been left unoccupied by the Germans.

Both the tunnel at Foug and also the bridge of Fontenoy were provided with mine chambers. Good plans of both works were in possession of the French, and, according to French accounts, accurate information was received concerning the German troops in the neighbourhood. Unfortunately detailed accounts on this point are not forthcoming, so that a comparison with the actual state of affairs cannot be instituted. At any rate the strength of the étappen troops left behind by the German armies was considerably overestimated, for the French supposed themselves to be in the midst of "20,000 Prussians."[2]

In the first place some companies of infantry and sufficient blasting powder appeared necessary. To obtain these the Committee had recourse to General Arbellot, the Commandant of Langres.

On the 16th of November, however, General v. Kraatz had appeared with half the 20th Division before this fortress, and had reconnoitred the north and west sides. Prussian detachments penetrated on this occasion as far as Peigney, at the foot of the work of the same name, which opened upon them a somewhat lively fire.[3]

This circumstance and the presence of strong German forces, the main body of the XIVth Army Corps, between Saône and Côte d'Or, disquieted General Arbellot to such an extent that he apprehended an attack upon the fortress. Although the garrison was already 12,000 strong, and a number of volunteer companies also were formed for external enterprises,[4] he replied to the Committee that he could only assist their project with his good wishes.[5]

The latter, however, did not allow itself to be discouraged by this, but resolved to organize by itself the force necessary for the undertaking. Two Officers who had escaped from Metz, Bernard, afterwards Commandant, and Lieutenant Coumés, undertook the execution of this duty. Some thirty soldiers escaped from the army of Metz, some volunteers of Alsace-Lorraine, a company of Forest Rangers, and a number of National Guards, formed the nucleus of the free corps assembled by them, which received the designation "Chasseurs des Vosges," and at a later date was attached to the 24th Corps.

Whether men also of the Légion Alsacienne et Lorraine, which had been exercised in the demolition of railways, were present, and if so, in what strength, is not mentioned in the French accounts. The instructions, however, which served for their information, appear also to have been utilized by the Military Commission of the Vosges.[6] They were, at all events, found in possession of an irregular who fell into the hands of the Prussians on the 22nd of January.

The small pamphlet, containing twenty-eight pages and three tables of figures, gave a judicious explanation of the method of obstructing lines, of

[1] Ernouf, p. 74.

[2] Rambaux, p. 38.

[3] The work fired 114 shots. Compare "Langres pendant la Guerre de 1870–71," p. 13.

[4] German official account (German edition), Part II, p. 1348, *et infra*.

[5] Rambaux, p. 7.

[6] The title of this pamphlet is as follows:—"Instruction a l'usage des corps francs et spécialement des francs-tireurs de la 'Légion Alsacienne et Lorraine' formée à Bordeaux."

carrying out demolitions of bridges, viaducts, tunnels, rails, telegraphs, and station buildings, and of destroying standing trains. The directions also contained accurate accounts concerning the stores and tools used for these purposes.

The clothing, equipping, and arming of the small band was attended with considerable difficulties, as the population, who feared that the German étappen troops would exact compensation for any raids of the corps, showed themselves by no means favourably disposed to the whole proceeding. In order to give the undertaking a better basis and a more extended sphere the plan was resorted to, in the middle of December, of forming a species of camp of instruction.

The wooded country near La Vacheresse, situated north of Lamarche, was selected as the site of this camp. This covers a plateau with many spurs, which rises some 196 feet above the surrounding valleys, towards which it falls with steep slopes, and is not easily accessible. The foot of the plateau is encircled by a ring of fairly-sized wealthy villages: La Vacheresse, Crainvilliers, Martigny-les-Lamarche, Villotte, Rocourt, Rozières-sur-Mouzon, Robécourt, and Sauville.

This circumstance facilitated the procuring of supplies, whilst at the same time there was good ground for hoping to be secure from the searches of the Prussian patrols in the forest of some 5 miles in diameter through which no important road ran.

In the interior of this wood a camp was first established which covered an area of 22¼ acres, and was enclosed with a palisaded polygonal parapet, and a chemin des rondes. A block-house and other defensive works secured the road which debouched on this space. In the ranger's house, which was situated in the middle of the camp, the Staff, the intendance, and the magazines were housed; around this barracks for the troops were erected. The outposts were disposed at the exits from the wood, where also preparations were made for housing small detachments. At the exit near the ranger's house of the Bois du Creuchot a whole company could find shelter. The French still continued to devote labour to strengthening the defensive works even after they had been first erected, and the French reporter asserts with some complacency that finally the camp could only have been taken by a regular siege. The main point here overlooked is that the position being so devoid of importance it would have been difficult to find an enemy to undertake this siege.

The training of the men and the further preparation for the projected enterprise could be carried on without fear of disturbance, as the nearest German étappen stations, Neufchâteau and Mirecourt, were too weakly occupied to send out troops from thence as far as the neighbourhood of Lamarche. The attention of the stronger detachment stationed at Langres was, moreover, fully taken up in observing the fortress, and in securing the railway line. The irregulars assembled in the camp of La Vacheresse could, therefore, also bring up regularly the provisions necessary for their maintenance, all the surrounding localities being compelled to contribute. Money contributions also were levied and recruits raised from the neighbourhood.

On December the 19th the Government Delegates of Tours finally resolved to employ the Ist Army of the Loire, under General Bourbaki, in Eastern France, against the rearward communications of the Germans, and now also the Military Commission of the Vosges received orders to postpone no longer the raid against Foug or Fontenoy. The order was soon followed by the transmission of maps of the country between Langres, Neufchâteau, Toul, and the German frontier. The belief was diffused on all sides that the march of General Bourbaki would take the direction of Langres. The intended enterprise appeared, therefore, of so much greater importance. At the same time it was assumed that by interrupting the railway line near Toul, the bringing up of reinforcements for General v. Werder could be prevented.

To carry out the enterprise the only thing still wanting was the necessary blasting powder, for the Chasseurs des Vosges had already advanced so far in their training[1] that the projected stroke might be attempted. The Military Committee had recourse again to General Arbellot, with a request for powder, but again, however, met with a refusal—apparently because the General placed too little confidence in the irregular band, and in the success of their project. He desired that, before he gave up the powder, Lieutenant Coumés should first personally examine the three points under consideration, Foug, Fontenoy, and Liverdun. But even after this reconnaissance had been successfully executed with the assistance of several officials of the Eastern Railway, General Arbellot raised new difficulties.[2] The refusal of the Commandant of Langres produced great discouragement in the camp, and an endeavour was now made to make the powder with their own resources. This idea was, however, again given up, as after numerous attempts they only succeeded in producing 55 lbs. of very moderate quality, whilst 880 lbs. of good powder were necessary.

Commandant Bernard, therefore, continued in the meanwhile to labour at improving the camp, and sought to increase his forces by recruiting volunteers and soldiers escaped from the surrendered fortresses. He succeeded also finally in organizing a small corps of mounted spies. The project of collecting the mobilized National Guards from the surrounding country was frustrated by the opposition of the population. Although the conscription was limited to unmarried men between 21 and 40 years old, yet the recruits deserted almost without exception.[3]

To the complaint addressed to the War Minister concerning the Commandant of Langres an answer had not yet been received when the first days of the new year dawned, and there was no longer any secret concerning General Bourbaki's advance upon Vesoul. Not till the 10th January did the order to hand over 880 lbs. of powder reach the fortress. Colonel Meyère, the former engineer of the place, who in the meantime had succeeded General Arbellot, also placed under Commandant Bernard's command the 4th Battalion of the Mobiles of the Gard,[4] which was about 800 men strong. It was quartered in the villages surrounding the camp of La Vacheresse.

The transport of the powder from Langres occupied several days in consequence of the great cold and of the slippery state of all the roads. When the powder was being handed over in the fortress the remark had been made that its condition could not be vouched for, but that there was rather ground for regarding it as deteriorated. Experiments, however, which were instituted, showed that the powder was still in good condition.

Provisions were sent on to the farm de la Hayevaux, north of Attignéville, where the first considerable halt was to be made. The evening of the 17th of January was fixed for the advance. Very bad weather, cold and frost, however, caused it to be put off to the 18th of January, at 5 P.M., at which time the Army of the East, after its fruitless assaults upon the position of the Lisaine, was already in full retreat. The little corps moved from the camp of La Vacheresse first in the general direction of Toul. The question whether eventually the tunnel of Foug, or the bridge of Fontenoy, should be aimed at, remained for the moment undecided.

On the German side the preparations of the band of irregulars and its growth had not remained unnoticed. Its activity was remarked on the 2nd

[1] The corps was at this time about 300 men strong. Compare Rambaux, p. 17.

[2] Ernouf, p. 80.

[3] Similar experiences were also undergone in Langres. Compare "Langres pendant la Guerre de 1870–71," pp. 55, 56.

[4] The list of the troops of the garrison given in the pamphlet, "Langres pendant la Guerre de 1870–71," pp. 52, 53, does not mention this battalion.

of December, a party of 1 sergeant-major and 15 men of the Düsseldorf Landwehr Battalion, detached to collect contributions, having been captured this day at Contrexéville, near Vittel. In consequence of this, Colonel von Schmieden, who was charged by the Government-General of Lorraine with the control of the étappen inspection at Epinal, detached on the 6th of December a flying column under Major v. Paczensky und Tenczin to the neighbourhood of Lamarche. The already mentioned Commandant Bernard attacked this column with about 150 Chasseurs des Vosges on the morning of the 9th December at Dombrot-le-Sec, but was repulsed after a short fight. On the 11th December, Major Paczensky reached Lamarche, dispersed, after a slight action, a hostile detachment posted there, and laid a contribution on the town. He could not, however, remain there for any length of time, but early the following afternoon was obliged to move off again to Monthureux-sur-Saône. During the course of the month of December, there occurred nothing in the neighbourhood of Lamarche which might have given occasion to detach troops thither again. Even the étappen stations, Neufchâteau and Mirecourt, situated in the neighbourhood and only weakly occupied, were not further disturbed. When, however, in the end of the month Vice-sergeant-major Steinmetz, who was captured at Contrexéville, was exchanged, he gave such detailed accounts concerning the arming of the people in the neighbourhood of Lamarche, that the attention of the Government-General was directed afresh to that district.

The vice-sergeant-major had found the inhabitants of Vittel and also of Contrexéville armed with Tabatière rifles, and had heard of the conscriptions in the surrounding country, the enlistment of volunteers, and also of the formation of several companies at Lamarche. He learned at the same time that line Officers escaped from Metz or Sedan were in command. On the 2nd December, at Lamarche, he had made the acquaintance of ten or twelve of the enemy's Officers, and had gathered from their conversation that they were informed concerning the state of affairs with the étappen troops, and also were everywhere in communication with men who were regarded by the Germans as above suspicion. It was expressed with the utmost frankness that the volunteers had taken upon themselves the task of cutting off all weak German detachments, and that it was their intention, after increasing their forces, to surprise by night the companies of the Düsseldorf Landwehr Battalion which were then quartered at Mirecourt, and, if possible, to capture them without firing a shot. A similar fate was then to be prepared for the garrisons of Neufchâteau and Void, as well as for the small detachments posted on the railway line to Commercy.

The prisoner frequently observed armed parties in the woods situated between Lamarche and Langres ; in Langres he saw the 50th Regiment of the Line and the 56th Regiment of the Gardes Mobiles, both of which belonged to the garrison.[1] In confirmation of these statements of Sergeant-major Steinmetz was a report of the garrison of Neufchâteau, which in the end of December had received information from different directions that a hostile detachment of from 300 to 400 men was quartered at Lamarche, and was expected to receive considerable reinforcements at an early date. The German Prefect of Epinal, Herr Bitter, gave also comprehensive reports concerning the action of the volunteers—their strength, their conscriptions, and their influence upon the country people.

Colonel von Schmieden was therefore directed, on the 4th of January, to relieve and set at liberty as soon as possible the 1st Reserve Jäger Battalion, which was posted partly on the étappen line Epinal—Vesoul. This battalion, together with a half squadron and some guns, was to be detached again as a flying column to Lamarche, and an expedition to be carried out by the

[1] Compare "Langres pendant la Guerre de 1870–71," pp. 52, 53.

detachments charged with the observation of Langres was to be brought into connection with it. The advance, however, of the French relieving army against Belfort rendered impossible the execution of this plan, Major von Paczensky, with two companies of the Reserve Jäger Battalion and the Saxon Reserve Light Battery, which was to detail the guns for the undertaking, having been drawn into the fighting on the Lisaine. No other troops were for the moment available, and from among the few companies quartered in Epinal none could just at this time be spared, as this town, which formed the connecting link for the communications of the German troops on the south-eastern theatre, appeared to be threatened from the south. From Neufchâteau alone an expedition on a small scale was carried out.

The Governor-General of Lorraine, General von Bonin, had given verbal instructions on the 11th January to Major von Dobschütz, Commander of the 4th Reserve Hussar Regiment, to repair to Neufchâteau, to take over the command there, and in connection with the troops from Chaumont and Epinal to act against the volunteer bands which had appeared at Lamarche. On the 12th of December (*sic*),[1] this Officer, accompanied by a division of hussars, had arrived at Neufchâteau, but had found there only a company of the Deutz Landwehr Battalion, 300 or 400 convalescent of the IXth Army Corps, and a division of hussars. Nothing serious could be attempted with these few troops, which were fully occupied in guard and escort duties. To Harréville only, where in the evening a hussar patrol had been fired at, was a small party detached, which arrested the assistant of the mayor, but found no trace of the enemy.

On the 13th two more companies[2] with a division of hussars marched into Neufchâteau, and therefore it was possible on the 15th to undertake a raid with the 2nd Jäger Company and 24 hussars, under First Lieutenant von Schoenfeld, by Rouvres-la-Chétive, and Chatenois to Bulgnéville, where several arrests were made, and arrears of contributions were collected. The detachments did not arrive at Bulgnéville till towards 7 P.M. in the darkness, the Jägers on carts. The place was occupied by the battalion of Gardes Mobiles which had come from Langres.[3] A sentry at the entrance challenged the leading hussars and then alarmed the guard. Soon afterwards a strongish hostile detachment appeared, which commenced to fire. First Lieutenant von Schoenfeld, whose chief instructions were to arrest some suspected persons in Bulgnéville, perceived by this time that this intention was frustrated, and he therefore commenced to retreat. The enemy then advanced with loud shouts from the Bois de Bulgnéville against the Chatenois road, but soon halted, and did not molest the further march of First Lieutenant von Schoenfeld, who passed the night with his troops in Chatenois, and returned thence by day to Neufchâteau.

The camp of La Vacheresse remained undiscovered on this occasion also. Moreover, the attention of the Government-General about this time was not only diverted by the proceedings of Werder's Corps, but there arrived also on January the 16th a report of Lieutenant Mossner, of the 4th Reserve Hussar Regiment, who had ridden from Nancy to Flavigny-sur-Moselle, to the effect that 2,000 to 3,000 Gardes Mobiles were supposed to have arrived at Vézelise. The Moselle bridges of Pont St. Vincent and Flavigny were therefore occupied in haste by parties of infantry; a few hussars were sent out towards Vézelise, and the attention of the étappen authorities in Epinal, Neufchâteau, and Charmes was directed to these proceedings. Mirecourt was no longer, since the 1st of January, occupied with troops. On the 17th it appeared that Vézelise was clear of the enemy; but a band of volunteers, several hundred

[1] The 12th of December is obviously a misprint for the 12th of January.—TR.
[2] Of the 1st Reserve Jäger Battalion.
[3] See p. 265.

strong, was reported to have marched recently from thence towards Neufchâteau. Pont St. Vincent and Flavigny-sur-Moselle, therefore, still remained occupied.

Commandant Bernard thus found, as he set off on the 18th of January, that the entire space between the Upper Moselle and the road Neufchâteau—Toul was completely clear of German troops. On this day, at 5 P.M., he commenced his advance with the éclaireurs, 300 Chasseurs des Vosges, and the battalion of Gardes Mobiles. A hundred Chasseurs des Vosges remained behind in the entrenched camp. The direction taken led through the hilly wooded district which stretches from Lamarche and the Monts Faucilles past the east of Neufchâteau and Colombey as far as the neighbourhood of Toul, where it extends on the one side close up to the Forêt de Hays which lies on the west of Nancy, and, on the other, to the woods near Vaucouleurs. Simultaneously with the departure of the column from the camp a few selected men were detached in the direction of Commercy to carry out telegraph and railway demolition at that place.

The march progressed under certain difficulties, on slippery roads or deep wood and field tracks. At St. Ouen-les-Parey the shelter of the forest was quitted, and then, towards 3 A.M., Chatenois, on the main road from Neufchâteau to Mirecourt, was reached, *viâ* Vaudoncourt, Aulnois, and Ollainville. At this place the column fell in with another detachment of the Chasseurs des Vosges, Bühler's company, which had penetrated as far as the neighbourhood of Nancy, with the object also of acting against the German communications, and was now in the act of retiring to Lamarche. This undertaking had, however, completely failed. Bühler's company was now instructed to engage the attention of the Germans in the opposite direction, whilst Bernard continued his march towards the Moselle.

From Chatenois onwards, according to the view of Commandant Bernard, the dangerous part of the march commenced. Although a distance of about 16 miles, through snow, on a winter's night and on bad roads, had been covered, he, therefore, still continued his movement, so as to pass Neufchâteau before daybreak. The Vair was crossed at the mill of Roche, lying in a woody ravine between Houéville and Removille. Then the column quitted the road, and moving across country through the Bois d'Attignéville, passed round through the large village of Attignéville, the inhabitants of which, it was feared, might be already stirring. Between 8 and 9 A.M. the farm de la Hayevaux was reached, which lies on a plateau on the edge of the Bois de Boinville, and is covered from the direction of Neufchâteau by thick woods. The march which had been accomplished was no mean feat for a force so raw, and composed partly of untrained men; for these, in a period of fifteen hours, had covered a distance of 24⅘ miles, almost entirely in darkness and partly without road or track. The battalion of Gardes Mobiles naturally arrived in a very exhausted condition. The spacious farm buildings afforded shelter to all the men; the provisions, which had been prepared beforehand, were abundant.

The enterprising leader had intended to continue the march on the evening of the 19th, but it appeared at the outset that the Gardes Mobiles, and particularly the Officers of the latter, were in no condition to stand a second night march.[1] Contrary to his wish he was obliged to decide upon postponing his advance for twenty-four hours.

The desired night's rest was greatly disturbed by a false alarm. Several shots were fired at the outposts; the troops in the buildings were called to arms, and the Chasseurs des Vosges, who were quickly under arms, patrolled the neighbourhood. No definite information could be obtained from the

[1] Rambaux says:—"The Officers in particular appeared to be exhausted and discouraged."

sentries, but it soon appeared that there was no danger to be apprehended. In the meantime the men also of the battalion of Gardes Mobiles had fallen in in front of the farm, without their Officers, however, who had taken up their quarters in the dwelling-house, and did not appear until some time later.

Commandant Bernard perceived that this battalion could be of little use to him, but, on the contrary, might easily involve him in new difficulties, and he resolved, therefore, shortly, to send it back to the camp. He came to this resolution also upon the further ground that it had been communicated to him that the garrison of Neufchâteau had been on the alert, sentries and patrols had been doubled, and the inhabitants had given up showing lights in their windows at night. He feared, therefore, that during his absence an attack might be made upon the camp, which he regarded as a supporting point for his expedition.

On January the 20th, at 8 P.M., the mounted éclaireurs and the Chasseurs des Vosges, in a total strength of 300, with the powder loaded on wagons, marched off again in the direction of Toul.

The vanguard was formed by a troop of mounted men, which from time to time sent out patrols, which ranged the country in different directions, several kilomètres in front. A man in civilian dress also rode or drove in advance. A trained dog accompanied the foremost detachment, which, with white and red lamp-lights, gave signals to the column which was following at a distance of 550 yards. The latter marched in the deepest silence, and with the order to take care to leave as few footmarks as possible in the snow. Smoking was forbidden. A rearguard secured the wagons, and several horsemen marching on the flanks of the column were instructed to take care that these did not become separated in the darkness. In the villages, men who were from Alsace went on in front to scare back into their houses the inhabitants, who from motives of curiosity might come out of their doors, by threatening them in the German language, and thus to arouse the belief that Prussian troops were passing through the place. The route led *viâ* Tranqueville to Harmonville ; then, near Autreville, $4\frac{1}{3}$ miles from Colombey, which was supposed to be garrisoned, the main road from Toul to Neufchâteau was crossed, and Vannes-le-Châtel was reached. From there the detachment struck into a forest road through the hilly district of the Forêt au dessus de Meine. The troops frequently sunk up to their knees in the snow in ascending and descending the slopes. Some of the men threw themselves down on the road in an exhausted condition, and had to be forcibly driven onwards. On the 21st, about 5 A.M., the second halting place, the farm St. Fiacre, was reached. During a night march of nine hours a distance of more than $18\frac{2}{3}$ miles, of which the last 5 lay through thick woods on hills, had been covered.

The farm St. Fiacre is distant only 666 yards from the main road leading from Toul to Vaucouleurs, but lies concealed in a deep wooded ravine. During the day, however, no man was allowed to show himself outside of the yard, so as not to be noticed by passing German cavalry patrols.

The provisions, which had been ordered beforehand, had not yet reached St. Fiacre, and, therefore, the men had temporarily to be housed without supplies. The Officers assembled in order to decide now whether the tunnel of Foug or the bridge of Fontenoy should be aimed at.

The tunnel of Foug, 1,222 yards long, which runs through the spur of a hill situated between the villages of Foug and Lay St. Remy, was only $6\frac{1}{4}$ miles distant from St. Fiacre. The road thither ran entirely through wooded country, so that discovery was improbable. The blowing-in of the tunnel would have caused an extraordinary obstruction to the traffic, and it was calculated that the Germans would require more than a month for the work of restoration. On the other hand, the matter was in this case so far attended with disadvantages, that each of the existing mine chambers had a

cavity of considerable size, so that after the charge had been lodged a very considerable amount of tamping would be necessary; it seemed also indispensable that the blow should be distributed in all directions by means of props prepared from telegraph posts. Finally, it was calculated that from five to six hours would be required to reopen the chambers which had been bricked up by the French shortly before the arrival of the first German troops; and thus the danger of being attacked by surprise was considerable, since the work had to be carried out in the middle of the tunnel.

At Fontenoy the execution of the work would neither last long nor be difficult; but, on the other hand, the spot was not so easy to reach. The distance to the bridge amounted to 15½ miles, and thus a third fatiguing night march was necessary.

Moreover, a serious action, if such occurred, would have to be fought with men greatly exhausted, and the Moselle[1] would have to be crossed without a bridge. The retreat also in any case was much more dangerous than from Foug.

After the pros and cons of this matter had been argued for long, but nothing had been decided, it was resolved to adjourn the deliberation to the next morning, and to await the return of the spies who had been sent out.

The latter reported on the following day that Fontenoy was occupied by not more than fifty armed men, whilst at Foug there was a company with several guns, which guarded the exits of the tunnel, and the sentries had recently been doubled. At a renewed council of the Officers the project as regards Foug was abandoned, and attention was now turned to Fontenoy alone, on the ground of these reports.

The provisions had in the meantime likewise arrived. The men cooked in the farmyard, and about 2 P.M. they marched off from St. Fiacre. The mounted éclaireurs were first sent back with the order to show themselves as much as possible in the neighbourhood of Chatenois and Neufchâteau. The wagons also remained behind after that 550 lbs. of powder, which was sufficient for blowing up the bridge, had been loaded on four horses, and firing apparatus, picks, axes, as well as the remaining tools, had been distributed among the men. The first part of the march lay still through wood, then the open plateau was reached, and the fortress of Toul was passed at a distance of 3 miles, its cathedral, as well as the outlines of the Mont St. Michel, upon which during the siege the batteries of the attack had been erected, being visible in the evening mist. Mont le Vignoble was reached by a footpath leading through the vineclad slopes, and finally Pierre-la-Treiche, about 7 P.M., by way of Gye and Bicqueley. The inhabitants of these places, who made known their surprise at the appearance of French troops, but afterwards brought provisions and wine, were deluded by the information that the corps of General Bourbaki was in the act of advancing rapidly, and that the fortress would probably be recaptured the next night or the following day.

In Pierre-la-Treiche, in the old castle, which was inhabited by a forest ranger, a short halt was made; after that Alsatians, covered with heavy cloaks and provided with Prussian landwehr shakos, and who spoke German, had been posted as sentries in the neighbourhood. This precaution appeared the more necessary because Toul was now still only 2½ miles distant. The ferry which crossed the Moselle near Pierre-la-Treiche, and which was to have been used, was at the moment not in working order. The boat lay fast in the ice, whilst the stream bore down frozen blocks; it was necessary, therefore, to get it clear first. The forest ranger in the meanwhile brought up a second boat from a place at some distance off.

About midnight everything was ready for the crossing, but as to reach

[1] The bend of the Moselle between St. Fiacre and Fontenoy is here referred to.—TR.

Fontenoy a march of 6¾ miles still had to be made, so now the time was pressing. In spite of the impenetrable darkness, the embarkation and the crossing of the stream were carried out without mischance by the light of the few lanterns. The ferry-boat held about forty men, and was worked backwards and forwards by the ferryman with a sail.

By a steep footpath the party climbed the bank lying directly opposite Pierre-la-Treiche, when some discharges of artillery, which resounded from Toul through the stillness of the night, caused them to halt. It was concluded that they were alarm signals, which had been occasioned by the reports spread during the advance, and the march was therefore hurried on. The Chasseurs des Vosges arrived at Villey-le-Sec through the Bois de Chaudenay. A direction was then taken along the Bois Gondreville and the Bois Jure. The column advanced but slowly, the greatest precautions being taken. Thus, for example, a man followed the detachment and carried with him a rake, with which to obliterate the footmarks in the snow. About 5 A.M. Fontenoy was reached.

Commandant Bernard first made a short halt in a hollow road, then passed very rapidly through the village of Fontenoy, and formed up the men opposite the station. The great darkness of the night concealed these preparations, the snow also smothered the noise of the footsteps.

Lieutenant Coumés and a non-commissioned officer, both of whom spoke German, hurried on now to the station, which was barely 111 yards distant, in order to overpower the sentry; the column followed after that the men had been warned beforehand not to fire.

On this station, on the 28th September, 1870, the first guard, consisting of 1 non-commissioned officer and 12 men of the 2nd Battalion Mecklenburg Fusilier Regiment, No. 90, had been posted, and the relief was carried out daily from Toul. A few days later was sent to Fontenoy a permanent detachment in the strength of 1 Officer, 4 non-commissioned officers, and 50 men, which posted in the station building itself a small guard, on which devolved in particular the guarding of the railway bridge. On the 15th of November the 1st Battalion (Geldern) of the 4th Westphalian Landwehr Regiment, No. 17, arrived in Toul and took over on the following day, together with the guards of Foug and Liverdun, that also of Fontenoy.

The duty of these three guards consisted in securing the great railway line Strasbourg—Paris along the section Frouard—Commercy. Whilst between Toul and the tunnel of Foug obstructions of the railway traffic had repeatedly been attempted, no such thing had ever happened within the reach of the guard of Fontenoy. Nevertheless, the superior commanders repeatedly drew special attention to the great importance of this particular section between Nancy and Toul.

The Government-General of Lorraine issued on the 29th of December special instructions concerning the action of guards over railway stations and concerning the arrangement of the patrol service. Moreover, repeated injunctions were not wanting that the small isolated detachments should be particularly on their guard, on account of the great activity of the franctireurs in the district of the Upper Moselle. Again, on the 8th of January, 1871, the étappen inspection of the VIth Army Corps at Nancy had called attention to the fact that it was in possession of evidence according to which surprises of small garrisons and railway demolitions on a considerable scale were being prepared.

Naturally also the advance of the French Army of the East must increase the enterprise of the volunteer bands, and already, with regard to this point, the necessity for the greatest watchfulness had been impressed upon the isolated detachments. So far as regards the garrison of Fontenoy, after the 11th of January, on which day a party of the 6th Company of the Geldern Landwehr Battalion, in the strength of 1 vice-sergeant-major, 2 non-commis-

sioned officers, 1 bugler, and 47 men, took over the guard, a reinforced patrol service had been ordered, but this extended almost exclusively to the examination of the railway line itself.

The guard duty at Fontenoy was so arranged that a double sentry occupied the railway bridge, which lay at a distance of 800 paces from the station buildings, whilst a single sentry was posted in front of the station buildings. A regular patrol communication was carried on with the station guards of Toul and Liverdun. The men not on guard were generally quartered at Fontenoy.

As in the night of January 21—22 several shots fell in the street of Toul, and it could not afterwards be discovered from whom they proceeded, the commandant, Lieutenant-Colonel v. Schnehen, caused some guns on the ramparts to be fired, so as by this means to put the neighbouring small posts and guards upon the alert. These shots, the same which disquieted the French party after crossing the Moselle, were also heard in Fontenoy, and caused the commander of the guard, Vice-sergeant-major Koch, to assemble the whole of his command at the station, to detach a patrol to Toul, to reinforce the double post on the bridge with two more men, to post a connecting sentry between the station and the bridge, and, in addition, to entrust a man with the observation of the exit from the village of Fontenoy. Even these increased precautions, however, would be of no avail, in case of an attack, to counteract the defect that the guard was quartered at too great a distance from the railway bridge which it had to secure.

However, the next hours passed without disturbance, and the men detached to Toul returned also with the report that nothing of importance had happened there. About 5 A.M. the sentries heard several light strokes of a bell from the church tower of Gondreville, which seemed to one or two men as somewhat remarkable, but by the majority, however, was taken as the commencement of the ringing for early mass. Whether this chime, which was also repeated afterwards, had any connection with the arrival of the raiding party, has not been established. The coincidence may just as well have been purely accidental, although on the other hand it is certain that several inhabitants of Fontenoy were cognizant of the whole expedition.[1] Scarcely half an hour afterwards the sentry who was watching the exit from the village saw the closely formed mass of the enemy's volunteers coming up the road towards the station. At first he took these for a group of churchgoers, and only ran back to the station buildings to give the alarm when the great number of those approaching struck him as suspicious.

But at the same time with him Lieutenant Coumés and his companion arrived at the station, and shortly afterwards the whole party. The station buildings which were not suited for defence were surrounded before the guard was prepared to offer resistance. The men were in the waiting-room, the commander with a non-commissioned officer in the office of the telegraph official where the report of a returning patrol had just been received. The soldiers, put on the alert by the alarm, hurried out of the door, but the foremost were wounded by thrusts from bayonets and daggers. The French broke in the windows, penetrated into the interior, and thus dispersed the guard, of which seven men were wounded, whilst the same number were taken prisoners. The majority of the men escaped in the direction of Toul, and acquainted a railway train, which had just left that place with French prisoners, with the occurrence. Private Pott, although wounded, had the presence of mind to turn in the direction of Liverdun, to run to meet the mail train approaching that place, and, by placing himself on the railway embankment, and shouting loudly, to bring it to a halt in spite of the darkness, and thus to avert a considerable misfortune.[2]

[1] Ernouf, p. 97.

[2] Private Pott received through the acting General in command of the VIIIth

Vice-sergeant-major Koch, who directly after the first shot found himself in the dark (for a bullet smashed the lamps in his room) in company with the two lance-corporals who had formed the above-mentioned patrol, got clear of the station on the side farthest from the village. He hastened along the rails to the bridge where, in case of an attack, every one was to assemble; but in the darkness he lost sight of his men, took again the road to the station, and soon found himself here opposite a group where he heard the German language being spoken. He recognized also the voice of one of his non-commissioned officers. In consequence of this he approached, but was now conscious of his mistake; too late, however, for he found himself suddenly surrounded by enemies, who had already made prisoner the non-commissioned officer, received a bayonet wound in the side, and in consequence of this wound had to surrender hinself to a French Officer who spoke German readily.

The French, after they had obtained possession of the station, put out patrols on the road to Nancy and Toul, sent a detachment along the railway towards Nancy, which was to tear up the rails and to watch the line, and then, after having entangled or cut the telegraph wires, hastened to the bridge over the Moselle.

The connecting sentry who had not left his post was cut down and afterwards mutilated; the double sentries on the bridge were driven away. Then commenced the search for the mine chamber, concerning which it was known that it was situated in the first pier of the bridge on the side nearest Nancy, and that the wooden cover of the opening lay about 11 or 12 inches beneath the surface. The work was commenced with anxious expectation, and as more than 31 inches were excavated without anything being found, the fear was aroused that a mistake had been made, or that the chamber had been filled in by the Prussians. At last, however, a wooden cover was hit upon, and now the shaft 13 feet in depth was opened. At the lower end of this two horizontal galleries ran sideways in the direction of the length of the pier, and each ended in a small chamber 6½ feet in depth, which was intended to receive the charge. Two miners descended by a rope ladder to bring the bags of powder to their place.

At the same moment the lights of the train coming up from Toul were seen in the distance. The volunteer band got ready to repel an attack although the rails at the other end of the bridge had been torn up, and therefore an obstruction existed. The miners hastily reascended from below, and one of them let the lantern which had been given him fall on the powder bag lying below. The lamp continued to burn, and thus put the men, who were for the most part crowded together on and against the bridge, in a position of extreme danger. However, a resolute miner climbed down again and extinguished the lamp.

In the meantime the train mentioned had come to a stop before reaching the bridge, and had steamed back again.

In the mail train which, from the other direction, at about a quarter past six o'clock, stopped 2½ miles in front of Fontenoy, were Captain Rössel of the 1st Lower Silesian Infantry Regiment, No. 46, some Officers and about forty men of different corps. Lieutenant v. Devivere, of the 1st Hanoverian Infantry Regiment, No. 74, and Vice-sergeant-major Lehmann, of the 1st Posen Infantry Regiment, No. 18, placed themselves immediately under Captain Rössel's orders, and the latter with the small party moved off in the direction of Fontenoy, whilst the train followed slowly. The railway track and its vicinity were examined with lanterns. Three railway signalmen in the mean-

Army Corps from Herr Albert, who was at that time the owner of the Hôtel de l'Europe at Mannheim, and who had been in the train, a reward of 3,000 marks (150*l.*).

while met them, but had as yet heard nothing of the surprise. The ringing of a bell thrice repeated and a murmur of voices in the distance were all that could be heard. Then about a quarter to seven o'clock sharp reports twice in succession were clearly distinguished, and the flash of powder was seen, and at first it was believed that guns were in action at Fontenoy.

In a mill two suspicious looking countrymen were arrested, whilst three other persons escaped over the hills. On advancing closer to Fontenoy, the day began to break, and now a gap could be perceived in the bridge over the Moselle. At this time also a detachment of fifty-five men of the Geldern Landwehr Battalion, under the command of Second Lieutenant v. Bethake, of the 3rd Hanoverian Infantry Regiment, No. 79, arrived from Toul on a train. Single hostile volunteers or armed countrymen firing off their rifles hastened away over the hills. The left flank patrol of Captain Rössel's detachment had frequently fired, and the latter caused Vice-sergeant-major Lehmann with a few men to turn the village of Fontenoy by the side most distant from the river, so as to prevent the escape of any of the enemy who might be concealed in the place. The small turning party was received with shots from the outskirts of the village, and it also saw a number of irregulars running away over the heights to Gondreville. A franctireur was here wounded and taken prisoner. This man gave out that he belonged to a detachment of Garibaldian troops, and had come up from Langres with about 1,000 men. In the search of the houses of Fontenoy which was then carried out, several of the inhabitants whose appearance was suspicious were arrested.

The relatively great distance which this detachment had to march, and the prolonged delay which was due to the search, had, however, allowed time to the Chasseurs des Vosges to tamp carefully the loaded mine, to withdraw themselves to a suitable distance, and then, amidst the exultant shouts of a crowd of people, which had in the meanwhile flocked to the place, to blow up the bridge. It appears to have been only the hostile covering detachment which was despatched in the direction of Nancy with which Captain Rössel had come into contact.

Commandant Bernard had selected for his retreat a different road from that by which he had come, and sought to gain the Moselle through the wood of Gondreville. About half-way between Pont St. Vincent and Pierre-la-Treiche, within the woods lying between Toul and Nancy, the Moselle was reached. The edge was covered with ice strong enough to bear, but in the middle the water for a breadth of from 4 to 5 feet was clear of ice. Captain Bernard resolved to cross the river without further preparation. He succeeded, by taking advantage of the largest blocks of ice, in bringing over the whole party inclusive of the prisoners. In the farm of Gimeys situated on an open space in the woods, about $3\frac{3}{4}$ miles distant from the Moselle, a short halt was made, and then the march was continued as rapidly as possible by field roads, in a southerly direction by Viterne and Thelod to Houdreville. This place was not reached till late at night. Since the start from St. Fiacre on the afternoon of the previous day, the Chasseurs des Vosges had marched $37\frac{1}{4}$ miles through snow and ice, partly without roads, had twice crossed the Moselle under difficult circumstances, and had carried out the surprise as well as blown up the bridge. On the next day, therefore, a short march only was made as far as the village of Vandeléville on the outskirts of the Forêt de St. Amond. During the retreat also the supply of provisions was well arranged. Women with lanterns came to the places selected for the halt and looked after the feeding of the men. On the 24th of January, at 7 P.M., the detachment reached Bulgnéville, where it was fêted with an illumination.

From Toul, as has been mentioned, immediately after the surprise became known a detachment had moved off early by rail to Gondreville, had also seen armed men on the heights behind the village, but had met with no

further resistance, and afterwards met in Fontenoy the 3rd Company of the Geldern Battalion which had moved off thither on foot. Deceived by false statements of the country people, both detachments continued their explorations throughout the day as far as the neighbourhood of Liverdun without finding anything in the woods except a few articles which had been thrown away by captured Landwehr men. General von Bonin had sent forward from Nancy, on the road to Toul, the 2nd Battalion (Münsterberg) of the 4th Lower Silesian Landwehr Regiment, No. 51, with a half squadron of hussars, which after carefully examining the woods lying on both sides, only reached the fortress at midnight. As Commandant Bernard, however, had already crossed this road in the early hours, this expedition also, as well as the explorations which were continued during the next days, was without result.

On the other hand, the battalion of Gardes Mobiles, which was sent back from the farm de la Hayevaux on the 20th of January, had in the meantime been overtaken by its fate. In its return march it had taken the main road from Neufchâteau to Lamarche, and early on the 21st of January it had just reached the neighbourhood of Vrécourt, when Lieutenant-Colonel v. Dobschütz with the 2nd and 3rd Companies of the 1st Reserve Jäger Battalion, the 5th Company of the Deutz Landwehr Battalion, and two divisions of the 4th Reserve Hussar Regiment moved into this place. This small column, having left behind its carriages and baggage, had started from Neufchâteau on the 20th, and had marched on that day to Bourmont. Leaving this place on the 21st, it had struck into the road by Graffigny Chemin, so as, in co-operation with the garrisons of Chaumont and Epinal, to range the neighbourhood of Lamarche, as this had been directed to be carried out by an order of the Government-General which arrived at Neufchâteau on the 19th. Lieutenant-Colonel v. Dobschütz detailed the 3rd Jäger Company, with 1½ divisions of hussars as an advanced guard, whilst the 2nd Jäger Company and 2 divisions of the 5th Deutz Company formed the main body, and 1 division of the latter company and ½ a division of hussars the rearguard. As soon as Graffigny Chemin had been traversed in the direction of Vrécourt, the advanced parties reported that the tracks in the snow indicated that a considerable hostile detachment had been in the act of advancing against the column, but must have turned round again. Soon shouts and singing, as well as the sound of French signals from different directions, were audible. The wood of La Voivre, south of the road to Vrécourt, which had in the meantime been reached, was so thick that it was not possible to traverse it. Captain Count zu Dohna, who had command of the three companies, ordered, therefore, that the advanced guard alone should remain on the road, but that the main body should bear away to the north where the wood was thinner. His object was to move out there on a broad front on the road Neufchâteau—Lamarche, where he hoped to meet with the enemy. This road was attained by both detachments without misadventure.

Not till a division of the 3rd Jäger Company advanced on the road to Vrécourt against the copse lying in front of this place, and two divisions of the 2nd Jäger Company sought to reach the adjacent north-west side of this place, did the enemy open upon the advancing detachments a hot fire. The copse was apparently strongly occupied. In spite of the short range, which from the enemy to the advanced divisions was only 80 or 100 paces, and to the main force about 250 paces, the irregular fire of the French was almost without effect. The two divisions of the 2nd Jäger Company advanced immediately against the copse, and commenced to act effectively against the enemy's flanks. The other parties replied to his fire with the best results from the ditches of the road and from folds of the ground. Soon all the Prussian detachments, upon the signal, "the whole will advance," charged the enemy, whose position in the copse was taken at the first rush.

The retiring Gardes Mobiles suffered here considerable losses from the independent fire poured into them at close range.[1] An Officer and 22 men of the enemy remained dead on the ground, and 17 severely wounded were found in Vrécourt after the action. The more slightly wounded appear to have been carried off.

The French battalion, once defeated, offered no further serious resistance, but evacuated Vrécourt after a few shots, as the companies of Lieutenant-Colonel v. Dobschütz were deploying for an enveloping attack. The hussars, meanwhile, pursued a few dispersed bodies which were retiring in a southerly direction. A part of the enemy sought from Vrécourt to reach the nearest woods, whilst the remainder climbed the steep heights to the north of this place, and from thence observed the assailants from a safe distance.

Lieutenant-Colonel v. Dobschütz had lost only 3 severely wounded, who died after a few hours, and 3 slightly wounded; 56 unwounded prisoners fell into the hands of the Germans. As, however, the dispersed hostile battalion, according to the unanimous statements of the prisoners, was supposed to be only a part of a more considerable force in the neighbourhood, which information appeared also to be confirmed by bugle sounds which were heard to the south, and as, moreover, the co-operation of the garrisons of Epinal and Chaumont could not be looked for before the 23rd, Lieutenant-Colonel v. Dobschütz resolved to return to Neufchâteau after a short rest in Vrécourt. Protected by the 2nd Jäger Company, which was pushed forwards towards the hills north of the place, the retirement was carried out without being disturbed. At 9 P.M., the little column entered Neufchâteau. The repetition of the expedition was not attempted, since in the meanwhile new orders had been received for the two jäger companies. The latter marched on the 24th with a detachment of hussars to Colombey, then to the neighbourhood of Pagny-la-Blanche-Côte on the Upper Meuse, and at a later date to Toul. The hut camp in the wood near La Vacheresse remained in this way unendangered, and served to shelter the returning column of Captain Bernard till the signing of the armistice. In virtue of a special agreement, which was concluded with the German troops on the 14th February, the latter were allowed to withdraw unmolested behind the line of demarcation.

In the meantime, on the German side, the restoration of the blown up bridge was energetically proceeded with. In consequence of the explosion the first pier on the right bank of the Moselle had been blown up, so that two arches of the bridge fell in. It was resolved to restore the crossing by building up an embankment in the gaps, and by supporting the second pier with masonry. By the extraordinary exertions of the 5th Field Railway Detachment, which arrived from Xertigny on the 24th January and was assisted by a Bavarian pioneer party, the Pontoon Column VIIth Army Corps, and 300 civilian labourers collected from the surrounding country, as well as by the zealous labours of the railway management committee at Nancy, it was again possible by the 31st January to push single wagons over the damaged bridge, by the 4th February to recommence the ordinary traffic on one line of rail, and by the 11th February on both lines of rail. Till that time troops and convoys of prisoners reached Fontenoy from Toul by march route to be transferred to another train at the former place. All trains with ammunition, provisions, and sick were moved by the northern line of rail *viâ* Mézières till the bridge was restored.

The village of Fontenoy had been burned down on the 22nd with the exception of a few buildings. Moreover the Government-General of Lorraine imposed a contribution of 10,000,000 of francs.

The blowing up of the bridge of Fontenoy did not occasion any material

[1] A French reporter characterizes the action as an engagement "sufficiently murderous." Rambaux, "Le Pont de Fontenoy," p. 24.

disadvantage for the operations of the German Army.[1] The approaching crisis at Paris could not be delayed in any way by this matter. Moreover, the intention of the opponent of preventing the bringing up of reinforcements for General v. Werder failed, as these were no longer being brought up by rail. As is well known, these had long since assembled on the Upper Seine, and at the time when the demolition took place were already seriously threatening the retreat of the French armies of the East.

Nevertheless, the expedition against the bridge of Fontenoy herein described merits our full appreciation.

On account of the perfection which explosives have attained since the last war, and the comparative ease with which they can be carried, success such as that gained at Fontenoy will in the future be still easier of attainment than formerly.

At the same time, however, this increases the obligation not only to guard against such demolitions more carefully, but also to make use of them more frequently. Before everything the defender should never lose sight of this kind of action upon the sensitive lines of communication of an invading enemy. The duties, however, resulting from it should not be exclusively assigned to raiding parties to be detached from the field army; for the Landsturm also a sufficiently wide field of action is to be found in this direction.

[1] The blocks in the traffic occasioned by this break have been greatly exaggerated, especially by the enemy. It is correct, as already mentioned in the work "The Franco-German War," Part II, pp. 1337, 1342, that for a period of eight days a complete stoppage of the main railway communication ensued, all trains destined for the IInd and IIIrd Armies being obliged to make a circuit *vid* Metz—Rheims—Epernay.

REVIEWS.

Zur Taktik der "Situation." Taktische Situationen und Massnahmen in der Schlacht. Von R. von Arnim. Oberst z.D. Heft 1–5. Berlin: Luckhardt, 1879–82. Pp. 340. Size 9″ × 6″ × ⅜″. Weight under 1lb. Price 7*s.* 6*d.*

Taktische Studien. By the same author. Heft 1–2. Berlin: Luckhardt, 1883. Pp. 172. Size 9″ × 6″ × ¼″. Weight under ½lb, Price 3*s.*

Year by year since the great struggle of 1870–71, military literature has been enriched by a succession of valuable studies, derived from the investigation of the marches, engagements, and battles in which most of the writers themselves took a part. One of the latest of these publications is the series of studies on tactics of which Colonel v. Arnim is the author, and they are remarkable alike for the careful exhaustive investigation of the subject with which he deals, and for the practical results he derives from it.

Departing from the ordinary methods of treating the subject, which commence for the most part with a consideration of the conditions in the field of minor units, and the manner in which they should be trained and conducted, v. Arnim boldly strikes out a new line, which is justified up to a certain point by the results. To ensure an intelligent and appropriate leading of minor units, he maintains that it is necessary that the general situation of the whole should be properly appreciated and constantly kept in view, not only by the commanders of the larger bodies, but also by those in charge of lesser units under them. To allow of this being carried out to perfection demands that natural quality expressed as the *coup d'œil militaire*, which cannot be created; but it can be developed and strengthened to a great degree by a careful study in detail of military history. This alone can enable Officers whose sole experience has been derived from peace manœuvres—generally differing so extensively from warlike operations—to recognize the general situation, and know how it can best be dealt with. And by the "situation" is meant, not the position in the field of this or that body, for it has a far wider signification, comprising both the strategical and tactical bearing of two opposing armies to one another, including the object, strength, and special circumstances of each, together with the nature of the ground, and its relation to both forces. If it be borne in mind that the "situation," as here depicted, varies often, not only from day to day, but with every movement of the troops on either side, inducing a change in disposition and a variation in the circumstances of the ground, it must certainly be acknowledged that the task set forth by von Arnim, as a material and necessary part of the military education of every Officer aspiring to the command of a body of troops in the field, is no light one. But, be this as it may, there is no gainsaying the statement, that the General at the head of an army of which the Officers commanding units have studied and learnt both to appreciate and utilize rapidly a favourable situation, or to judge an unfavourable one, and take prompt measures to meet it, will have an element of success in his favour of no small value. A good leader, in fact, proves himself to be such if he understands how to treat the situation he finds himself confronted with, in such a manner as best to fulfil the object of the Commander-in-Chief. Tactical generalizations and theoretical principles will not give him this power, which can alone be obtained by a profound study of war, as it has occurred in modern times, in its every detail.

Practically, this system has been adopted in principle by the German Army, the characteristic of the tactical instruction being to avoid binding any leader by

unchangeable normal formations, while imposing upon him the obligation of mastering the "situation" under every circumstance. These principles have been laid in peace time, partly by means of practical manœuvres, and partly by the system of tactical studies widely disseminated throughout the army. To this cause was due in a great degree the uninterrupted series of brilliant and successful operations in 1870–71, in which the mobility of the German troops, and the initiative of the leaders, were the striking features. On the other hand, the movements and handling of the French troops was marked by a want of mobility and an absence of initiative, brought about by a want of appreciation by Officers of the actual situation and a blind adherence to fixed formations.

The object then of these "studies" is to encourage and assist the Officer in his endeavour to strengthen his power of grasping the situation, under whatever aspect it may present itself, which will induce a quick clear decision; to offer an easy means of recognizing and controlling similar situations by comparing them with one another; to show that a leader need never remain inactive before a situation, but that, grasping its characteristics, he should promptly introduce it into the special task assigned to him, and, finally, to impress upon him that, far from his entire attention being directed to the formation and maintenance of definite tactical forms, it should be concentrated upon the appropriate division, movement, and application of the force at his disposal to the object in view.

To allow of this object being obtained, it is evident that the strategical situation must be clearly stated and generally known, so as to allow subordinate commanders to act in the absence of orders or in changed situations, with a knowledge of the object in view. As an example of this the orders issued by the German Head-quarters in 1866 are contrasted with those of Benedek in the same campaign, and it is shown also how the absence of orders to the French Army in 1870 left them to fight without knowing the object in view, and debarred contiguous divisions coming to the assistance of those engaged, as was notably the case at Spicheren.

The tactical considerations, therefore, in the "Studies" are connected in each case with specific strategical situations, as follows:—

1. Dispositions on the frontier immediately subsequent to the declaration of war.
2. The commencement of operations in the field.
3. The period shortly before the collision of the main forces.
4. The battle itself with its strategic objects.
5. The strategic situation after the battle.

Under the first head the situation in 1866 is instanced, when the outposts, though mostly weak, could be pushed on without fear of coming into collision with an enemy, and the situation contrasted with that on the Saar in 1870, when they had orders to fall back in case of an offensive being taken by the French, who had assembled large forces on the frontier. The general conclusion arrived at by v. Arnim on this head is, that at the outset of future campaigns, where the nature of the country permits of it, the work will fall more than formerly on cavalry, as experience has shown that strong cavalry divisions are able to occupy and observe extensive tracts of country without any immediate support by infantry.

In treating of the second strategical period, the general dispositions observed in the advance of the Germans on Spicheren and Forbach are compared with the different conditions under which the advance into Bohemia was made in 1866. At this period the situation will be governed by one of three strategical considerations, in which the object is to delay operations, to take the offensive, or to assume a defensive attitude. The investigation of these, as demonstrated by the campaigns discussed, leads to certain general rules, which are noticed as differing materially from the teaching of peace manœuvres. Of these the most important are, that an army marching to take the offensive will be sufficiently concentrated if its parallel corps do not exceed in breadth a day's march, and if the hindmost column is about a day's march from the advance. To enable it to assume the defensive, at least two divisions should be able to occupy successively a good position, the corps next in rear being only half a day's march from it.

Referring especially to advanced guards, it is pointed out that the practice of each column forming its own has superseded that of having a special one for the whole army, and that the despatch of the cavalry to the distance of a day's march

in advance obviates the necessity of localities being minutely examined by the advanced guard, which avoids much delay. At this period also the pushing forward on approaches of cavalry vedettes at night, with picquets posted in defensible localities, allows of a connected line of outposts being generally dispensed with.

The tactical measures appropriate to the third period, shortly before the collision of the main forces, are briefly and well summarized as follows:—

1. To be constantly and correctly informed of the enemy's movements, while your own are jealously concealed.

2. To assemble the required forces unobserved at the decisive point or points.

3. To mislead and deceive the enemy's forces, enticing them, when possible, in false directions.

4. To employ artificial measures to facilitate attack, or, if on the defensive, to delay the enemy's advance.

5. To keep the forces entire, and in as good condition as possible by assuring an ample supply of ammunition and provisions, and attending to sanitary measures.

To the neglect of every one of these maxims is attributed the unfavourable position of Bazaine on the 14th, 16th, and 18th August, whereas the measures of the French before Coulmiers, in October, is cited as an example of the reverse, when 70,000 men were concentrated within two short marches of Orleans without the Bavarian corps being aware of it. Treating of the defensive, it is shown how secondary is the natural advantage of ground where the above maxims are disregarded, as exemplified by the strong positions held by the Austrian North Army, on the right bank of the Elbe, on the 29th and 30th June, 1866. On this occasion no selection was made of good outpost positions, arrangements for patrolling the river were neglected, no preparations were made for the destruction of bridges, cavalry was not pushed forward, and the arrangements for concentration were such that every corps almost reached its bivouac in an exhausted condition.

In contradistinction to this, although the training and formation of the Austrian South Army differed in no respect from that of the North, it showed itself quite different in almost every particular. There was nothing to be noticed in it of undeviating tactical formations, or of the helplessness and lack of appreciation of situations which characterized the subordinate leaders of the North Army. The careful and appropriate measures of the commander sufficed to create in his army the knowledge of the decisive importance of the situation, which had its result on the field of Custoza.

Besides the instances already quoted, this period is also exemplified by the examples of the advance preceding the battle of Wörth (4th and 5th August, 1870), that before Colombey-Nouilly (13th and 14th August), the movements preceding Gravelotte (17th August), the concentric march before Sedan, and the advance of Prince Frederic Charles and the Grand Duke of Mecklenburg on Orleans. Each is given in considerable detail, so far as it relates to the points under investigation, the cases are compared, and general deductions drawn and comments made of the utmost value for the student who will study them with care. Amongst these general deductions may be mentioned the following:—

1. The most important tactical principle before a decisive battle is to endeavour by every possible means to increase the chances of success, whether it be by a timely concentration of superior forces, by promptly seizing on favourable conditions which may offer, or by means of well-considered measures of a more purely tactical nature, such as are dwelt upon in the maxims previously quoted.

2. The present equipment and arms of the mounted service enable the cavalry division to lend valuable aid by gaining intelligence of the enemy, while masking its own forces, by misleading the enemy, making offensive demonstrations, and holding the enemy's troops, which will often render it of more use during this period than in the actual battle.

3. Infantry must be kept as complete as possible, and outposts have to refrain from getting uselessly and seriously engaged. If detached, unsupported infantry has for its task to hold the enemy or force him to deploy, it must make the most of the ground, strengthen its position, and, if possible, hold on to it until dusk.

4. Artillery is required principally at the decisive points, and until required to act in masses, only single batteries should, as a rule, be employed.

5. It is the greatest relief to great armies not to march in too close formation. The difficulty is, while avoiding this, to be able to concentrate at the given time and place, a result which can alone be insured by most careful preparatory arrangements.

In passing to the investigation of the fourth period, viz., that of the battle itself, v. Armin points out that, contrary to the usual system, he proposes to begin with the requirements and laws governing the force as a whole, deriving subsequently from these those controlling the subordinate leaders, the troops, and, indeed, every separate unit to the smallest patrol. In doing so, however, he presupposes that Officers will enter on these studies with a knowledge of the regulations and directions for the movement of troops, as well as of the usual tactical principles in the field, as required for the Officers' examinations. He further explains the reasons for adopting his system to be, that the material principles which govern each unit in the special task it has to perform must be derived from the general tactical situations of the battle.

In the tactics employed in a battle of the present day it is necessary, as formerly, to aim at bringing a preponderating force to bear on the decisive point; but it is impossible to bring up columns in deep formation for the purpose. The troops have, therefore, to be brought up successively, without the possibility of retaining their normal formation, or of recovering it even, unless favourable cover should be available. They must keep pressing into the front line, where alone a decision can be arrived at. In this dissolution of normal formations, the direct leading of superior commanders is lost, and the abandonment of the original order of battle is a necessary evil, which has to be reckoned with.

In the continuation of the "Studies" v. Armin has for his object to investigate by what means, of the most simple nature, the special difficulties are to be overcome, which meet the leaders both of considerable bodies and their individual units. This he does by a consideration of the special circumstances of some of the more modern battles, and he chooses for his purpose those of Custoza and Loigny, for the reason that these were, so to speak, impromptu battles, in which neither of the opposing armies had taken up a definite defensive position beforehand, a circumstance which rendered it most difficult, but at the same time very necessary, to adhere to a definite plan of battle.

The detailed consideration of these battles are too lengthy to follow, admirable as they are for study, and reference to them will be restricted to the comments made on that of Custoza under the following heads:—

1. Partition of the troops for battle.
2. Advance and method of covering it.
3. Deployment and grouping of forces.
4. Development of troops to attack.
5. Conduct of the battle itself.

The partition of the troops must be suited to the actual situation; but, so far as is possible, the normal units must be kept intact. On the Italian side the command of an Army Corps was rendered more difficult by the partition of the troops composing it into four divisions, while on the other hand the divisional unit was altogether wanting in the Austrian Army, with the exception only of the newly-formed reserve division; and this led to many difficulties on the part of the corps commanders. The brigades into which the Austrian corps were divided consisted each of six battalions, one rifle corps, and a battery, an appropriate partition: for almost every brigade had its own special object to attain. But the Italian divisions were even more advantageously partitioned into two regiments, each of four battalions, a rifle corps, and one battery.

Referring to the second head, lines of advance cannot alone be decided by the extent of front required for deployment, being dependent on the number and direction of the roads. Certain general rules may be enunciated, bearing in mind that these must be governed by the special situation:—

(α.) The most careful calculation must be made of the times at which units should be set in motion, allowance being made for defiles to be passed.

(β.) Where possible different roads should be allotted to the troops in second line, and rapidly prepared where necessary.

(γ.) The march should be covered by a wide movement of cavalry supported by advanced guards, or by the successive occupation of positions by the first line covered by weak advanced detachments, which will avoid isolated engagements. Thus, at Custoza, the first position was the general line, Sommacampagna—S. Giorgio—Castelnuovo; and the second, Sommacampagna—Vetterara—S. Rocco—Aliosi. The second line rendezvous'ed at fixed points conforming to the movement of the first line.

On account of the long range of modern arms and the great defensive power of rapidly deployed troops of inferior strength, serious engagements must be carefully avoided by advanced guards before sufficient forces are in position behind to carry them through.

As regards the third head: a too early deployment must be avoided; though, where space admits of it, a temporary halt may be utilized to close up and bring the heads of battalions in rear level with the leading one. Generally speaking, the latest and most timely deployment will be, when all is in readiness for the attack, or when the troops come under effective massed artillery fire, which ordinarily implies the presence of large forces of the enemy.

The formation of an army for battle often differs materially from the deployment of its larger units. The former implies a certain grouping of forces, without a definite reference as to extent of front, the first line being grouped in given directions on commanding points from which to deploy for attack—as Sommacampagna, S. Rocco, Aliosi; the second line on points from which they can be moved up in support in several directions—as the line of railway, in the first instance, and subsequently Cavazze and Zerbare.

Under the fourth head, artillery preparation precedes the development for attack. The simultaneous advance of large bodies in fixed order of battle, which was formerly the rule, is now limited to short decisive movements, as that of the 2nd Brigade, VIIth Corps, against Belvedere.

This important period is reserved by v. Arnim for closer investigation after the study and comparison in greater detail of the battles of 1870–71.

Referring to the fifth and last head, it is pointed out that isolated advances must be carefully avoided, and are only justifiable for a special object. Large bodies should be preceded by an advanced line, to throw into confusion the enemy's first line, and prepare the way for the main attack. Both the advanced and first lines must look carefully to the protection of their flanks. It was owing to a neglect of this precaution that the Austrian attack was first brought to a standstill. The best means of ensuring unison between these two lines appears to be for the advance to push forward from position to position, pausing in each to close up, as was done by the two brigades of the VIIth Corps. The co-operation of forces in a steady controlled advance will generally lead to more satisfactory results than pressing forward too rapidly, lest the enemy should have leisure in which to reform.

The fact of the immensely heightened importance of a full development of the line of fire has led many to conclude that no close formations can be made use of, but notwithstanding this, such a formation should never be laid down as will render it impossible to make use of moral effect, or withdraw the troops from the control of their leaders.

The general principles of the battle as a whole having been dealt with as described, v. Arnim proceeds in his "Taktische Studien" to investigate and compare the situations presented by a number of the battles of the 1870–71 campaigns, with a view to ascertaining how far the three principal periods of an actual battle—viz., the introduction, engagement of the deployed masses, and the decision—have their special tactical laws. This portion of v. Arnim's valuable work must necessarily be left for future notice, as his investigations are barely commenced in the parts published up to the present time, and their scope is limited to the consideration only of the battles of Königgrätz, Orléans, the Lisaine, and Wörth, in their first stage alone.

In conclusion, it may be confidently stated that such Officers as will make this publication a subject of conscientious study will gain an amount of valuable practical knowledge regarding the conduct of troops in the field that could hardly be

derived from any one other military work, and the system on which it is written may be strongly recommended to the notice of those who have to do with the tactical education of our Officers, though it will be generally admitted that the author goes somewhat too far in his requirements as to the degree of knowledge required by every Officer regarding the general situation.—H. H.

Traité Élémentaire d'Hygiène Militaire. Par S. ROSSIGNOL (de Gaillac), Docteur en Médecine de la Faculté de Paris, Médecin-Major de première classe en retraite, Chevalier de la Légion d'Honneur. Second Edition, révisé et considérablement augmentée. 1883. Paris: L. Baudin et Cie., 20, Rue et Passage Dauphine. Pp. 566. Size 9″ × 5½″ × 1⅝″. Weight under 1¾ lbs. Price 6*s.*

This is the second edition of a work which has had some reputation in France. It is divided into two parts, the one treating of the "Subject of Hygiène;" that is, the individual man under his various aspects of age, temperament, &c., and the other treating of the "Matter of Hygiène;" that is, the external things and conditions which influence the health of man. The old division of Halle, into *circumpesa, ingesta, excreta, applicata, percepta,* and *gesta,* is retained; a division which has a somewhat pedantic air in the present day.

A few points of interest may be selected:

Relations of Height, Circumference of Chest, and Weight in Recruits.—The minimum height in France up to 1872 was 1·56 m. (=61½ inches), and the girth of chest was to be taken at one-half of this, 0·78 m. (=30¾ inches). Our proportions are nearly the same, though the absolute figures are higher, viz.:—34 inches of girth for heights from 64—70 inches, 35 above 70. As regards weight, from 700 to 725 grammes are to be allowed per centimetre of girth—equal to 4 lbs. for every inch. An English recruit ought, therefore, to weigh at least 136 lbs. (9 stone 10 lbs.), and a French soldier, 123 lbs. (8 stone 11 lbs.), or 55½ kilogs. In 1882 the height was fixed at 1·54 m. (=60½ inches).

Habits.—Dr. Rossignol, although himself a smoker, is inclined to condemn the use of tobacco, as producing more harm than good. The evidence for this, however, is wanting, and considering the pleasure most men seem to derive from it, it is at least a question if it ought to be proscribed entirely, although its abuse is certainly to be condemned.

In the second part of the work the author devotes some pages to refuting the old ideas of lunar and sidereal influences upon man, a work of supererogation in a work on practical hygiène at the close of the 19th century!

On page 71, line 2, there is a misprint, 27 degrees Centigrade being stated to be the temperature of the body, instead of 37,—or 80° F. instead of 98·4° F.

The effects of heat, light, and electricity are discussed, and then follows a section on air, in none of which is there anything to be noted that has not already appeared in most of the text-books.

A considerable section is devoted to infectious diseases, principally as affecting soldiers; and here it is to be noted (as also elsewhere) that the author seems to have almost entirely ignored any English authorities on hygienic subjects, except in a few classic quotations from authors who are already cited in French works. Under the head of *typhus,* for instance, he attributes the differentiation of *typhus* and *typhoid* fevers to the report of Dr. Baudens, who was Principal Medical Officer of the French Army (or rather Special Commissioner) in the Crimea. On the other hand, it is thoroughly well-known that the honour of the discovery is due especially to the late Dr. A. P. Stewart and to Sir William Jenner, whose names are not even mentioned. His remarks on the subject of *scurvy* are certainly behind the age. Under the head of hospital gangrene, there is no reference to Lister, or the antiseptic method of prevention. A good deal of space is wasted in speaking of the *treatment* of disease, particularly venereal diseases, a subject quite out of place in a work on hygiène. A chapter on malaria follows, succeeded by a very brief one on soil, another on waters in general, and a somewhat longer one on climate.

From the remarks in the chapter on barracks and hospitals, it would seem that there is still much to be desired in the French Army in the matter of hygiène.

The maximum nominal space per man is 14 cub. m. (=500 cub. ft.) for cavalry, and 12 cub. m. (=425 cub. ft.) for infantry, but it is evident that this is only partially adhered to, and that there is consequent crowding with its attendant evils, whilst the regulation distance between the beds is only half a metre (=19½ inches). The description of the latrines and urine-tubs recalls conditions which have happily been greatly improved in our Service. For hospitals the space and ventilation recommended are both too low—30 cub. m. (=1,060 cub. ft.) per head, and the air changed only once per hour. 1,200 cub. ft., and the air changed three times an hour, is the minimum that ought to be aimed at. The Regulations give as cubic space in French military hospitals 20 cub. m. (=700 cub. ft.) for severe cases, and 18 cub. m. (630 cub. ft.) for ordinary cases, to be changed apparently once an hour. The author himself recommends for ordinary ventilation (say in barracks) 16 cub. m. (=565 cub. ft.), and for hospitals generally 30 cub. m. (=1,060 cub. ft.). Altogether we cannot say that the author on this subject is on a level with the science of the age.

The next chapter is on field hospitals and their equipment, and is very brief. This is followed by one on the medical and surgical statistics of campaigns. In the chapter on camps, &c., the author speaks of the *tente d'abri* as still a part of the French soldier's equipment; it was certainly the intention to abandon it, and we have not heard that it has been reinstated in favour.

In the matter of clothing it may be noted that there is a desire to give up the shako as a head-dress for the field and to substitute a *képi*, with some such modifications as ear-flaps or the like. The stock has been replaced by a *cravate*; and in 1881 the time-honoured gaiter was dispensed with, and *brodequins*, half-boots, substituted for shoes. Socks or stockings are still unused in the French Army; unfortunately so, according to the author. Other authorities, however (*e.g.*, Professor Vallin, of the Val de Grâce), think it better that the soldier should not have socks. The weight of kit, &c., is calculated at 24 kilogs. (=53 lbs.) in time of peace, and 30 kilogs. (=66 lbs.) in time of war. Morache reckons it at 72 lbs. A short chapter is given on the use of baths. Next follows a more detailed one on food and beverages, in which much is discussed that is of little practical use for the soldier. Some slight additions have been made to the soldier's ration, ½ oz. of coffee and ½ oz. of sugar per day; whilst the non-commissioned officers get 3*d.* a day for wine. The rations are, however, still insufficient, being wanting in nitrogen and fat, as is the case with our own troops. M. Rossignol, while denouncing excess in alcoholic drinks, is far from preaching total abstinence, and considers that a moderate ration of wine or other liquor is advantageous for the soldier.

The remainder of the work is devoted to the consideration of exercise, including marching and working in the gymnasium, &c., duration of life, statistics of mortality, the effects of the work in the different branches of the Service on health, and recruiting.

As regards mortality, the deaths in the French Army have diminished, in consequence of improved conditions, in a way not unlike our own. Forty years ago the rate was 20·4 per 1,000, in 1879 it was only 7·99, some 20 per cent. less than that of civilians, instead of being double, as it was before. The deaths, however, are still too numerous, for 2·7 per 1,000, or just one-third, 34 per cent. of all rates are due to typhoid fever, a distinctly preventible disease, whereas in our Army the proportion is only 0·26 (1880), or 3·8 per cent. of all deaths, just *one-tenth* of the French ratio. To those who know the unhygienic condition of the latrines, &c., in France these numbers need not be surprising. On the other hand, the deaths from phthisis are only 1·14 per 1,000, or less than 15 deaths out of every 100, whereas in our Army the deaths are still 2 per 1,000, or 29 out of 100 of all deaths, or 34 out of 100 deaths from disease alone.

In speaking of the Law of 1882, which was intended to emancipate the French Medical Department from the unjust and pernicious control of the Intendance, the author points out how ingeniously this has been evaded by an insidious clause which places the control of the expenditure entirely in the hands of the Intendance. This will have to be rescinded, as upon the independence and initiative of the Medical Department depends to a large extent the health and efficiency of the Army, especially in war-time, a proposition abundantly proved by our own experience.—F. DE C.

Professional Papers of the Corps of Royal Engineers. Edited by Major VETCH, R.E. Royal Engineers Institute Occasional Papers. Vol. vii. 1882. London. Stanford. 1883. Pp. 294. Size 9″ × 6″ × 1¾″. Weight under 2 lbs. Price 10*s.* 6*d.*, post free.

Usually, papers drawn up for the technical branches of the Service are of little interest to the profession generally, but to this rule this volume is an exception. It contains two papers only: one, "Lectures on Permanent Fortification," by Captain J. F. Lewis, R.E., delivered at the Royal Engineers Institute, Chatham, in the spring of 1880, and extended, corrected, and revised down to the spring of 1882; the other, "Notes on Armoured Defences," by Colonel T. Inglis, C.B., R.E.

The editor says:—We believe we are putting into the hands of the Officers of the Corps a thoroughly reliable text-book on permanent fortification at the present time. . . . . It must not be forgotten that alterations and modifications in the details of permanent fortification are continuously being made, as indeed they must be to keep level with the advances made in the arms of precision; and that, although this book is a reliable text-book to-day, it may not be so long; but having established a basis which is reliable at this time, it will be comparatively easy to supplement it from time to time by a record of the advances and changes that have been made."

The writers of the papers are specially versed in the subjects of which they treat, and the information put forward by them cannot be easily obtained elsewhere, if at all.—L. A. H.

The Egyptian War of 1882. By Lieutenant-Colonel HERMANN-VOGT, of the German Army; a translation. London. Kegan Paul. 1883. Pp. 228. Size 8″ × 5½″ × 1″. Weight under 1¼ lb. Price 6*s.*

The author of this work considers that "the proper moment seems to have arrived to describe, briefly and comprehensively, the warlike events that have taken place during the last few months" in Egypt. "Time alone can completely elucidate the extraordinary circumstances, both political and military, connected with this short campaign; and therefore, although the best available information has been used, as well as that afforded by the daily papers, and although a strictly truthful representation of facts has been attempted, many inaccuracies and errors of judgment will no doubt be found in the following pages; yet it may be hoped that this book will not entirely miss its aim if it affords to the military student a foundation for more detailed research, and to the general reader an interest in recent events, and a clue to the unravelling of future political transactions."

The translator, whose name is unknown to us, has in carrying out his work made "a few slight corrections of errors in matters of fact, easily ascertainable now that the war is over." These corrections it would, however, have been wise to indicate by notes. Otherwise the work is left without comment or alteration. The translator intimates, however, that the author has been occasionally misled in regard to his judgments of the English Government, the War Office, the army organization, or the habits and customs, which the writer supposes to be characteristic of England. It is to be hoped that, in the next edition, mistakes made with regard to the War Office or army organization may be noted, as the value of the book will be much increased thereby. Although we agree with the translator, that these misconceptions are of little importance as compared with an independent criticism, free from partiality or indulgence, yet, on the other hand, the value of the criticism depends much on the importance of the misconception. "A searching review of our military system, its weak points, the difficulties which beset us in sudden emergencies, coming as it does in connection with striking successes in the field, cannot," as the translator says, "be without its uses." No doubt, in the words with which he concludes his preface, "Such criticism will be valuable in proportion as it reflects the military public opinion of the largest and most highly trained army in modern Europe:" but how far Colonel Hermann-Vogt is a reflector of that opinion we cannot say.—L. A. H.

Report from the Joint Select Committee of the House of Lords and the House of Commons on the Channel Tunnel; together with the Proceedings of the Committee, Minutes of Evidence, and Appendix. London. 1883. Sold by Hansard, Eyre and Spottiswoode, &c. Pp. 574. Size 13″ × 8¼″ × 1½″. Weight under 3 lbs. 10 oz. Price 7*s*.

Index to the Report. Pp. 121. Size 13″ × 8¼″ × ¼″. Weight under 12 oz. Price 1*s*. 4*d*.

Hostilities without Declaration of War. An historical abstract of the cases in which hostilities have occurred between civilized Powers prior to declaration or warning. From 1700 to 1870. Compiled in the Intelligence Branch of the Quartermaster-General's Department by Brevet Lieutenant-Colonel J. F. MAURICE, R.A. London. 1883. Sold by Clowes, Harrison, &c. Pp. 90. Size 9¼″ × 6″ × ½″. Weight under 10 oz. Price 2*s*.

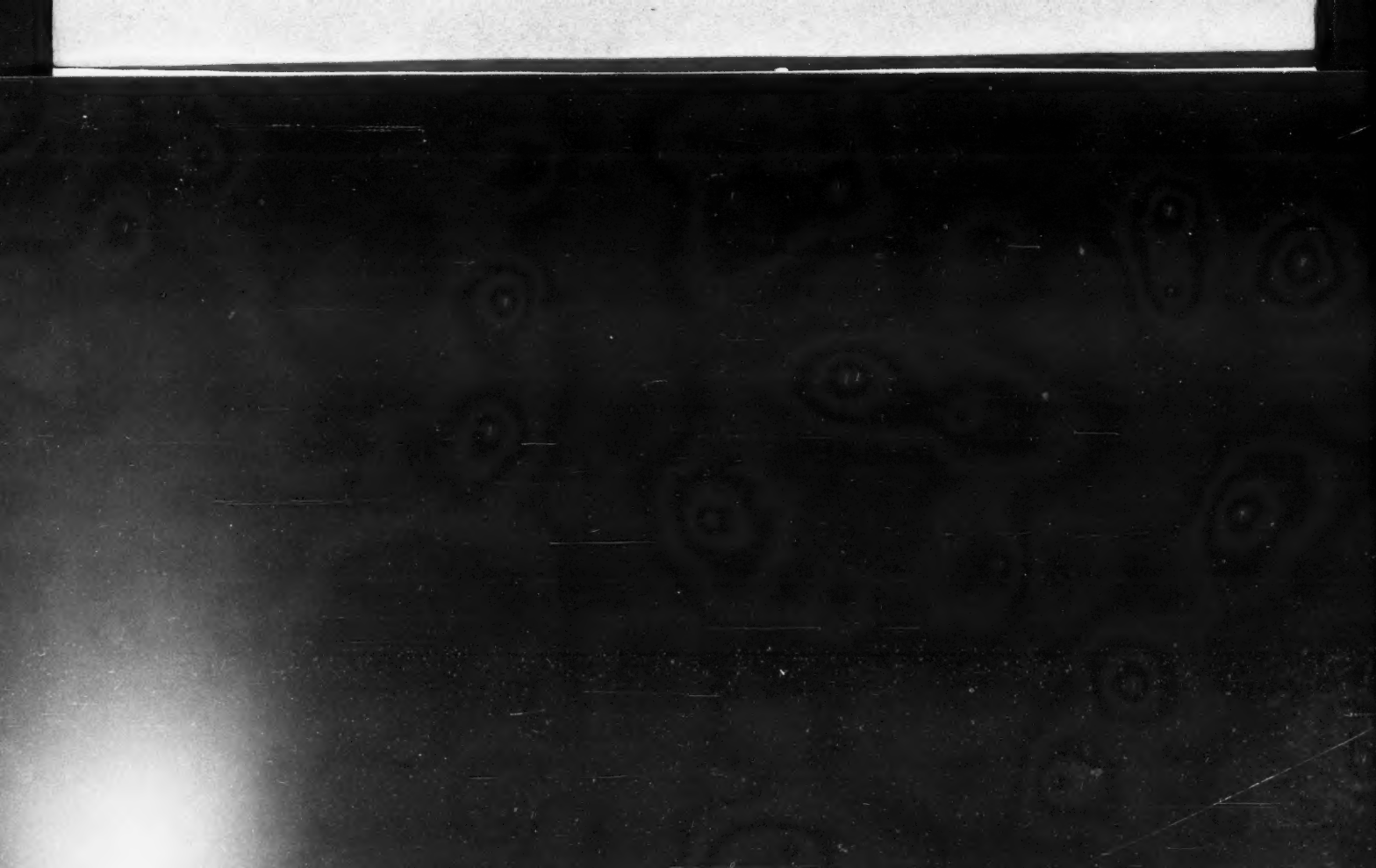
In these volumes will be found nearly everything that can be brought forward either in favour of or against the Channel Tunnel. The witnesses who gave evidence were severely cross-examined, and both sides of the question are thoroughly put before anyone who will take the trouble to study the Report. The Index will be found of very great assistance. The important compilation by Colonel Maurice formed Appendix G to the Report, and is now published separately, and is supplemented with an Index and a list of authorities quoted.—L. A. H.

A Handy Text-Book on Military Law. By Major F. COCHRAN, Hampshire Regiment, Garrison Instructor, North British District. Edinburgh and London. Blackwood and Sons. 1884. Pp. 320. Size 7″ × 5″ × 1″. Weight under 14 oz. Price 7*s*. 6*d*.

The writer of this Text-Book has given in a concise form the information necessary to enable a candidate to pass the examination for promotion. In order to obtain a thorough knowledge of the military code, it is necessary not only to study the Army Act, the Rules of Procedure, and portions of the Queen's Regulations, but also to know the reason for various enactments and rules, the objects of certain regulations, and other points of law concerning which the author furnishes information. The synopsis of those parts of the Reserve Forces Act, 1882, and of the Militia Act, 1882, which enter into the syllabus for examination, are also useful additions to the work.

We are glad to see that the author devotes some pages to giving examples of forms of charges, this being a part of the subject which always causes difficulty to the student.

The chapter on evidence is valuable, and gives in a compact form all that a student need know of the matter, and with the exception of some slight inaccuracies, as for instance at page 202, where the soldier is spoken of as forfeiting his pay for every day of absence *over five; under five* at discretion of Commanding Officer, the book will be found a valuable aid to Officers reading for their promotion.—C. W. F.



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B. BURGESS, Captain,
Secretary.